Potential NASA Bridge Partner List

The following NASA Scientists and Engineers have expressed their interest and willingness to partner with potential applicants to the Bridge Program. We reached out to NASA researchers in Fall 2023, to identify potential NASA partners and research areas, and received nearly 70 responses from scientists and engineers at NASA Centers across the country, who conduct research in all 5 of the Science Mission Directorate (SMD)'s science divisions: Astrophysics, Biology & Physical Sciences, Earth Science, Heliophysics, and Planetary Science. Each of these researchers gave us their contact info, a list of research keywords, where they work, and a brief statement of their research and mentoring experiences. This list is meant to be used as a resource for new Bridge PI's to help identify potential NASA partners for Bridge proposal partnership development where no current relationship exists. This is not an exhaustive nor exclusive list of potential NASA partners for Bridge proposal. A NASA person need not be on this list to participate in a Bridge proposal.

List up to date as of: 9 Feb 2024

Name: Africa Ixmucane Flores-Anderson

Email: africa.flores_at_nasa.gov

NASA Center: Marshall Space Flight Center

Institutions: Any or all, happy to partner with any institution interested in applying SAR and/or hyperspectral data for ecosystem monitoring and/or management.

SMD Division: Earth Science

Keywords: Land cover changes, Hyperspectral, Synthetic Aperture Radar (SAR), Remote Sensing

Research: Potential projects will be relevant to NASA's Earth Science division. Research partners interested in developing solutions and applications to monitor and enhance management of different ecosystems using satellite remote sensing datasets are relevant. This can include, but are not limited to, enhancing the management of forests, mangroves, wetlands and/or lakes using state-of-the-art remote sensing techniques.
The lines of research I'm interested in lied on applications of satellite remote sensing for land cover mapping, including detection of forest disturbances, and monitoring and forecasting of water quality.

Mentoring: I'm interested in building a long-lasting partnership in which we can provide a fruitful environment to nurture the next generation of Earth Science scientists. Ensuring there are opportunities for learning, growth and development of applied and novel science.
Depending on the location of the applying PI we can set-up regular meet ups online and/or in-person with the PI and students as appropriate. I would also like to ensure that we plan for some week-long visits to NASA MSFC for hands-on trainings, presentations and partnership building with broader science community. In addition to collaborating in peer-reviewed publications, I would like to ensure that students co-convene training events with PI and NASA.

Websites: Personal: http://freshwater.net/home

Name: ALLEGRA LEGRANDE

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NASA Center: Goddard Institute for Space Studies

Institutions: All/Any

SMD Division: Earth Science

Keywords: climate modeling, atmospheric science, paleoclimate, atmospheric rivers, volcanoes

Research: climate extremes (atmospheric rivers, extreme rainfall)
volcanic impact on climate
paleoclimate / historical insights to human-climate interactions

Future climate change will likely be beyond the range of the observational 'training period' over which all of our state-of-the-art climate models were designed. I specialize in finding ways to characterize climates more extreme than the historical period, implementing a means to validate the climate model against these extremes, and finally improving the model in instances where there is a mismatch between simulated and inferred (from proxy archives) climates. My research spans abrupt and extreme climate changes caused by relatively rare large stratovolcanic eruptions to extreme rainfall events called by atmospheric rivers as well as large background climate changes caused by large changes in greenhouse gases and even continental configuration.

I am interested in the hydrologic cycle, and in particular tracers of the hydrologic cycle such as water isotopologues. These tracers are useful for establishing the provenance and (rainout) history of air parcels. They are also useful as a tracer of past climates (ice cores, cave deposits, ocean sediment cores, etc.). I do experiments with a general circulation model (the kind used in predicting future climate change) to discover details about the hydrologic cycle in the past and present in hopes of improving our ability to understand this part of the climate in the future.

Mentoring: My goal for my graduate students is for them to be first author on peer-reviewed publications. My goal for my junior students -- high school and college level -- is to give them data analysis tools and research approaches that will be useful in any future field they choose to pursue.

I try to balance literature review and conceptual understanding tasks with the functional skill of doing data analysis on large datasets. I like to give students a starting set of something that 'works', then encourage them to pursue their own means to meet and exceed their starting set of tools.

I prefer having standing meeting times with students about once a week with additional 'office hours' I keep open for further discussion. My 'grit' expectation for my students is that they work to the best of their ability to solve problems on their own for at least 15 minutes, but no more than an hour without having made any progress before reaching out to me or other collaborators/students/mentors. This protocol is to balance the development of self problem-solving skills to build students capabilities and confidence, while avoiding unproductive, longer frustration of making no progress at all.

I typically work with groups of various skill level (high school, college, grad student, post doc, colleagues) ALL working collaboratively together and with me.

Websites: https://science.gsfc.nasa.gov/sed/bio/allegra.n.legrande

Name: ARBY ARGUETA

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NASA Center: Jet Propulsion Laboratory

Institutions: Hispanic Serving Institutions, 4-year college

SMD Division: Earth Science

Keywords: earth science, deep space, planetary science , astrophysics

Research: I am interested in the transformative role of computational resources in shaping the future of space exploration and Earth science. The extensive array of digital tools available to system designers, such as GPUs, RFSOCs, processors, programmable fabric, and machine learning accelerators, holds immense promise. My primary focus lies in optimizing the utilization of these resources, envisioning new algorithms, and pioneering innovative solutions. Proficiency with these tools empowers us to forge a path towards the future.

Currently, my research centers on the implementation of mission-enabling technologies through the efficient deployment of processors and computational power in various elements used for Earth and space exploration, including satellites, spacecraft, rovers, and scientific instruments. My expertise in this domain allows me to explore diverse areas of interest, spanning planetary and Earth science.

Mentoring: I'm a dedicated mentor with a proven track record of fostering growth, curiosity, and collaboration in various settings, from my community involvement to professional roles. My mentoring philosophy revolves around striking a balance between leadership and autonomy. I provide guidance and structure without stifling creativity, ensuring individuals own their research topics and find the motivation to overcome challenges.

My diverse leadership experiences have equipped me with the ability to understand individuals, adapting my communication to align with their personal goals. This approach has allowed me to create results-oriented teams that value individual growth.

I leverage humor, kindness, and social events to build cultures of support and collaboration, reminding team members of our collective purpose during moments of frustration. Regular status updates with personal touches and technical workshops ensure the team's continuous learning and connectivity in remote work environments.

I see myself as a mentor who provides structural support to help individuals progress in their research work. Weekly meetings ensure everyone's voices are heard, and inputs guide the research's direction. I offer one-on-one support where it's most needed.

In this program, I aim to share my insights from over 15 years at JPL in technology development and flight projects, providing the "why" behind them. I'm committed to making a positive impact on underrepresented communities beyond JPL, contributing to a brighter future for all.

Lastly, my mentorship style is influenced by stoicism, emphasizing our power to respond to challenges with resilience and innovation. We can overcome any obstacle as a team by finding creative solutions. The power to innovate is always in our hands.

Thank you for your consideration

Websites: https://www.linkedin.com/in/arbyargueta/ http://arbyargueta.com/

Name: Ashok Prajapati

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NASA Center: Goddard Space Flight Center

Institutions: 4 Year college

SMD Division: Biological & Physical Sciences

Keywords: AI and Deep Learning, Computer Vision, Robotics

Research: Using AI/Deep Learning for pattern recognition, signature detection and classification. Writing software for biological data analytics, Data Processing, Data Mining, Artificial Intelligence in general.

Mentoring: Experimental and agile in practice which means meeting couple of times a week. Help students in timely manner with shoulder to shoulder approach.

Websites:

Name: AVRAM MANDELL

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NASA Center: Goddard Space Flight Center

Institutions: Any or all

SMD Division: Astrophysics,Planetary Science

Keywords: exoplanets, habitable planets, infrared telescopes, space missions

Research: We are exploring a concept for a future space mission to detect the thermal emission from known planets around the nearest M-stars (much smaller and cooler than our Sun). The goal is to characterize the atmospheres and surfaces of the nearest potentially rocky habitable planets in order to constrain the surface temperature and atmospheric composition and potentially search for signs of life.

We are looking to partner on both precursor science investigations (planet discovery, data demonstrations and simulations, target modeling, science motivation) as well as technical maturation (MIR detectors & optics, integrated system modeling).

Mentoring: We have a broad and diverse research team, composing both planetary and astrophysics scientists as well as technologists and engineers, spanning a range in career status and background. Our team utilizes a "constellation mentoring" approach, where each member of the team has communication pathways with both peers as well as senior team members and more junior early-career researchers. We have regular hybrid meetings for both project planning and advising as well as more social activities. Finally, each ECR has a direct senior mentor who works with them one-on-one to provide advice on both research pursuits as well as career advancement.

Websites: https://seec.gsfc.nasa.gov

Name: Benjamin Scarino

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NASA Center: Langley Research Center

Institutions: I am happy to partner with any institution type.

SMD Division: Earth Science

Keywords: Satellite Remote Sensing, Earth Radiation Budget, Severe Convection, Land Surface Temperature, Machine Learning

Research: I have thirteen years of expertise in space-borne instrument calibration/validation studies, land surface temperature retrieval algorithm development, and satellite-based severe weather analysis and climatology assessment. I am a satellite remote sensing specialist with research that emphasizes absolute radiometric inter-calibration and cloud property retrieval in support of the Clouds in the Earth's Radiant Energy System &#40,CERES&#41, project, which seeks to enable improved understanding of Earth's radiation budget. My aim is to employ novel machine learning solutions to various Earth remote sensing efforts, including cloud retrieval augmentation, imagery anomaly extraction, surface skin temperature estimation, severe hail prediction, and imager stability monitoring. Potential research projects for undergraduates and involved faculty might center around satellite instrument calibration/validation studies, the use of satellite-identified overshooting convection to validate models, or any application of machine learning/deep neural network approaches to Earth remote sensing tasks.

Mentoring: My mentoring approach entails open communication and flexibility. I want students to feel confident to take part in knowledge sharing, ask questions, and voice concerns. I aim to be responsive and well engaged with the participant's needs, and I recognize that those needs may be different for different students. Allowing for adjustments in the approach, such as tailoring toward use of email, online collaboration tools, or group/one-on-one virtual meetings as the primary communication method, can help meet the needs/preferences of the individual/individuals.

Websites: https://science.larc.nasa.gov/people/benjamin-scarino/

Name: Breann Sitarski

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NASA Center: Goddard Space Flight Center

Institutions: Any institution type

SMD Division: Astrophysics

Keywords: wavefront sensing and control, large telescopes, coronagraphy, interferometry, metrology, optical testing, ultrastability

Research: I work on the engineering and science driven by extremely large telescopes. In the past, I was the Deputy Project Systems Engineer at the Giant Magellan Telescope, where I worked on wavefront sensing and control, optical testing of the large segments for that telescope, and metrology to ensure that the telescope would be aligned at first light and stay aligned. I also performed modeling studies with the integrated modeling group to inform error budgets. I am a member of the Habitable Worlds Observatory Technical Assessment Group and lead the Science and Engineering Interface Working Group, where I work on putting together fast models to enable sensitivity studies. I am also a member of the ultrastable structures laboratory, where I use optical feedback from interferometry to measure the picometer-level stability of test articles and to mature technologies for Habitable Worlds Observatory.

Mentoring: I am interested in teaching students how to learn. I work with the student to understand their interest and abilities, then build a project with the student based on their interests and my strengths. Students learn about optics, statistics, data analysis, coding, and processing. Most importantly, I teach how to set up an experiment and try to have students look at the bigger picture and how their experiment fits into a larger mission. I've mentored one graduate student and two honors undergraduate students for their theses. I have also worked with numerous Research Experience for Undergraduates (REU) students as a graduate student.

Websites:

Name: Brendan Anzures

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NASA Center: Johnson Space Center

Institutions: any or all

SMD Division: Planetary Science

Keywords: planetary geochemistry, meteorites, experimental petrology, Mercurian petrology, XAS spectroscopy

Research: My research integrates experimental petrology with geochemical analyses of meteorites to investigate the redox, volatile, and thermal evolution of planetary bodies and how magmatic volatiles influence the geochemical affinity, compatibility, and volatility of elements. I obtain high-fidelity geochemical data using a combination of several analytical instruments, including analytical microscopy (EPMA, SEM), secondary-ion mass spectrometry (SIMS), laser ablation inductively coupled plasma mass spectrometry (LA-ICP-MS), x-ray absorption near edge structure (XANES) spectroscopy, infrared spectroscopy (FTIR), thermogravimetric analysis (TGA), and evolved gas analysis (EGA). In addition, I am a regular user of the synchrotron facility Advanced Photon Source (APS) at Argonne National Lab. Because astromaterials are often the products of exotic chemical environments, laboratory experiments are critical for putting such analyses into the proper context. My experimental repertoire spans a range of pressures and temperatures and includes my own developed experimental setups. These include meteorite vapor deposition experiments, piston-cylinder, multi-anvil, in-situ X-ray microtomography, and falling sphere viscometry experiments.

Some potential research projects could include melt speciation of silicate melts to understand chemical partitioning changes due to redox and sulfur abundance changes, meteorite outgassing measurements and condensate formation to understand the development of primordial atmospheres in the early Solar System, and volatile abundances of meteoritic apatite to understand volatile reservoirs and their evolution in the early Solar System.

Mentoring: My mentoring philosophy focuses on inquiry driven learning and student-centered learning to generate enthusiasm and self-motivated students. My passion for working toward greater diversity, equity, and inclusion in the geosciences has been fueled by my experiences as a Filipino-Indian American born to parents who immigrated to the U.S. As an undergraduate and graduate student, I was recognized for outstanding service and leadership with a Rensselaer's Founders Award of Excellence in 2015 and GeoClub Award in 2018. As a graduate student, I served as a peer mentor to four first year students. In 2022, I mentored an LPI/ARES undergraduate summer intern. Currently, I am on the steering committee for Asian Americans and Pacific Islanders in Geoscience (AAPIiG) and the Geochemistry lead for Mercury Exploration Assessment Group (MExAG). Geoscience remains one of the least diverse fields in STEM, but with continued dedication from more people, I believe we can make a big difference.

As an advisor, I believe that one of the most important aspects of mentoring is building on students' strengths to overcome their weaknesses. For example, I used a previous intern's experience with optical microscopy of thin sections as a jumping off point to learn reflectance microscopy and SEM chemical petrography of thick sections that do not show bright, characteristic, birefringence colors (thick sections are necessary for LA-ICP-MS). And while she enjoyed laboratory work, I had to use that as a reward for making steady piecewise writing progress throughout the summer. One quote that I try to embrace is "be the role model you needed when you were younger."

In my experience the most effective mentor-mentee relationships emphasize clear expectations and take an interest in both professional and personal welfare. People commit to and want to stay in fields with people who they connect with, especially individuals from underrepresented groups. As a GeoClub International Mentor Coordinator, I mentored four first year international graduate students (three of whom are women) with their graduate school courses, research, and life transitions. While hosting international potlucks do not win research awards, they definitely raised our spirits to continue working enthusiastically during work hours.

Websites: brendananzures.com

Name: Brittany Cymes

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NASA Center: Johnson Space Center

Institutions: All

SMD Division: Planetary Science

Keywords: mineralogy, transmission electron microscopy, astromaterials, analogues, surface processes

Research: Investigations of mineralogy and petrology of astromaterials and planetary analogues centered around or complimented by electron microscopy (EM) (e.g., SEM, TEM) and related microanalytical approaches (e.g., EDS, EELS). Our broad objective is to provide a better understanding of the origin and evolution of the solar system by studying materials at the micro- to nanoscale. Potential research projects include novel application of EM to astromaterials (e.g., Moon, asteroids, meteorites, etc.) and analogues (e.g., analogues of planetary environments, impact craters, etc.) research questions and studies of early and continuing alteration of asteroids and the Moon, including space weathering, shock, and aqueous alteration.

Mentoring: High-value scientific instruments like EMs are not equally distributed among institutions of higher learning in the United States. However, knowledge about and access to these instruments can be essential for entry or advancement in STEM fields. Our team provides access to world-class EM facilities for conducting planetary science research in a highly collaborative environment with hands-on training in sample preparation, instrument operation, data collection, and data processing available. We have broad experience in mentoring individuals with diverse skill sets and backgrounds. Collaborations are undertaken with an expressed commitment to provide a safe, fair, respectful, and inclusive environment for all individuals. The contributions of all participants, regardless of background, are recognized as valuable and we aim to benefit from the shared knowledge across the teams.

Websites: https://ares.jsc.nasa.gov/people/bios/brittany-a-cymes/

Name: Caleb Scharf

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NASA Center: Ames Research Center

Institutions: Any

SMD Division: Astrophysics,Planetary Science

Keywords: Astrobiology, exoplanets, AI/ML applications

Research: Astrobiology, relevant to the Planetary Science division at SMD (including the Astrobiology Program), and to Astrophysics through the study of exoplanetary science. Interests and potential projects include:
- Analysis of 3D climate models of exoplanets to study impacts on photon-harvesting life of different planetary configurations and properties.
- Development and application of AI/ML techniques to a broad variety of topics in astrobiology, including biosignature evaluation and instrument design, and generative approaches to existing planetary datasets.
- Modeling of asteroid impact ejecta transport in planetary systems using gravitational simulation codes.

Mentoring: I have 22 years of experience in teaching and mentoring as a scientist at Columbia University before joining NASA in 2022. My approach to mentoring is to serve as a guide not an instructor, I want to hear peoples' ideas and interests and help them discover how to discover - no matter what their starting point. I am also acutely aware of the disparities in opportunity that exist in science, and the ongoing barriers of diversity and inclusion that must be removed. I work to make it clear to students that their wellbeing and sense of belonging is paramount, and that their process of learning is unique to them and that uniqueness is important. I also always work to support students future trajectory by collaboratively discussing their plans beyond any given project.

Websites: www.calebscharf.com

Name: Carl Malings

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NASA Center: Goddard Space Flight Center

Institutions: I am interested in partnering with any under-resourced institution. I think that institutions which are more focused on training students in specific technical skills (such as 2-year institutions or community colleges) rather than more research-oriented institutions will probably be most relevant to the kinds of projects I am interested in.

SMD Division: Earth Science

Keywords: Air Quality, Forecasting, Applied Science

Research: My research focuses on combining multiple sources of air quality information, including atmospheric chemistry and transport models, satellite remote sensing, and in-situ measurements, to improve the estimation and forecasting of air quality on local to global scales. I am also involved with the NASA Applied Remote Sensing Training (ARSET) program, which provides training in how to access and use NASA data products for applications, such as in health and air quality topics (which is my subject area within ARSET). Together, these activities are relevant to the SMD Earth Science division in its applied science health and air quality thematic area.
Some ideas for potential project include:
1. Creating tools (websites, mobile applications, Jupyter notebooks) to make NASA model and remote sensing data for air quality more easily accessible for community scientists and for air quality managers, particular in under-resourced communities.
2. Low-cost air quality sensors (LCS) are a key emerging technology that empowers communities to monitor their own air quality, I am interested in synergies between these and satellite remote sensing, e.g., using satellite data to identify hot-spots which can then be monitored with LCS, or corroborating community LCS data with satellite-based analysis to build a stronger base of evidence to advocate for policy changes.
3. Investigating how air quality warnings, advisories, and forecasts impact people's activities and decision-making (e.g., avoiding outdoor activities, buying air filters, etc.), how should information from air quality forecasting models be presented to air quality managers and the public? Does the accuracy of the forecast and/or its spatial resolution play a role, or do other social or economic factors play a larger role?

Mentoring: I don't have a lot of formal experience in mentoring. However, based on my graduate school experience as a teaching assistant for an introductory engineering course and my current experience as a trainer for the NASA ARSET program, I enjoy the challenge of explaining complicated topics in simple, relatable ways, as well as the satisfaction of seeing people take this knowledge and apply it to address their own problems. My approach to mentoring would involve taking time initially to understand the needs and motivations of the mentee as well as their level of experience and expertise. Based on that, I would start by sharing materials or pointing them to resources which would give them any background information they would need to begin to tackle the question at hand. Once equipped with these basics, I would let the mentee set their own pace in addressing the challenge, for example, they may be confident enough to work on their own with little supervision, only getting feedback for major challenges or milestones, or they may require more frequent guidance and course-correction as they begin to build this confidence. Throughout the process, I also hope to be able to learn from their approach to tackling the problem, in order to anticipate how I can best support their approach to problem-solving, as well as identify mentorship strategies which would work best for different kinds of learners in the future. Finally, I hope to be able to learn from my institutional collaborators (who will likely have far greater experience with mentorship) as I share my air quality and applied remote sensing expertise with them.

Websites: https://science.gsfc.nasa.gov/sci/bio/carl.a.malings

Name: Catharine Conley

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NASA Center: Ames Research Center

Institutions: Researchers working on questions for which my research expertise is relevant.

SMD Division: Planetary Science

Keywords: astrobiology, life detection, analytical framework, field sampling campaign

Research: My research involves life in extreme environments, both detecting biosignatures of cryptic microbial life and adaptations of Earth life to spaceflight conditions. I have led projects to put biological experiments in space and participated in field campaigns to deserts on three continents, as well as being the principal investigator of a cell biology research lab.

Mentoring: Rather than handing people pre-defined research projects, I prefer to encourage students to develop their own questions and support them in figuring out how to go about developing a research program to answer them. This involves more discussion and coaching, than instruction/direction.

Websites:

Name: CHRISTIAN DELACRUZ

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NASA Center: Kennedy Space Center

Institutions: Open

SMD Division: Biological & Physical Sciences

Keywords: Biomimesis, Materials Circular and Cyclical Design

Research: 1) Agrobyproduct biomaterials for astronaut suits & structural designs.
2) Biomimetic and metamaterials design & development for multfunctional, adaptable space habitats, aerospace craft and propulsion systems

Mentoring: Explore perspectives of nature as model, measure and mentor with empathy, compassion and humility. The importance of biodiversity for adaptations that thrive, in forms, processes and systems. How the elements of ethos, reconnect and emulation are essential for designs to adapt and endure. Tools such as science, technology, engineering, arts and mathematics are in found in nature, which includes us. Explore how integrating design principles help us thrive in disturbances and other operating conditions (water, gravity, limits/boundaries)

Websites:

Name: CHRISTOPHER STRICKLAND

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NASA Center: Goddard Space Flight Center

Institutions: community college, HBCU, native American, 4-year college

SMD Division: Astrophysics,Heliophysics,Earth Science,Planetary Science

Keywords: smallsat, payloads, ESPA, balloons, sounding, rockets

Research: Experienced lead engineer working on proposals and projects in many SMD technical areas. Many years working on research and technology development projects under NPR 7120.8 that have flown on many platforms from aircraft to balloons to sounding rockets. Product development lead for large satellite supporting Earth science under NPR 7120.5 working with aerospace vendors and international partners. Support proposals with principal investigators to tailor instrument requirements to match to flight opportunities.

Mentoring: Have mentored many young engineers as they began their NASA career as well as supporting student missions. Each person is mentored differently. In depth discussions with individuals to determine what they want and need as part of the learning process to develop their professional and personal skills. Mentoring approach tailored to each person to ensure they feel part of the team and understand their contribution to the project.

Websites:

Name: Daniel Whitt

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NASA Center: Ames Research Center

Institutions: any, but particularly HSI in the broader San Francisco Bay Area

SMD Division: Earth Science,Planetary Science

Keywords: ocean, biogeochemistry, circulation, mixing, climate

Research: My mission is to help scientists and society understand and respond to the dynamics and consequences of ocean variability and change on Earth through research. Specifically, my research builds scientific understanding of the upper ocean, including the physics, chemistry, biology, and their interactions and role in weather, climate, and Earth system dynamics.

In this context, I strive to precisely understand, monitor, and predict the oceans at NASA. My background is in applied mathematics, so most of my contributions derive from innovative applications of applied mathematics or numerical models on large computer systems, e.g. global Earth system models, ocean circulation models, large eddy simulation or single-column turbulence models, biogeochemical and ecological models, machine learning and other empirical statistical models, among others. But I analyze and, in some cases, help collect a wide range of observations at sea with a global network of colleagues and students that I'm always looking to expand. These observations have included biological and chemical water samples from ships, measures of temperature, salinity, and turbulence from robotic ocean floats and gliders, as well as measures of various surface variables from satellite.

I'm currently studying several topics, including: 1) interannual biogeochemical variability in the subpolar North Atlantic, 2) boundary layer mixing and watermass properties in the Southern Ocean, 3) upwelling, mixing, and biogeochemistry in the equatorial Pacific, and 4) the role of viruses and microscale physics in ocean's biological pump. Finally, I'm working on an ecological conservation effort to predict, intercept, and understand the ecological consequences of large floating marine debris around the Palmyra Atoll National Wildlife Area in the tropical Pacific.

The bottom line is that I would be thrilled to expand my current efforts or develop new projects studying the upper ocean with new colleagues. In addition, I'm open to new collaborations that would enrich my fundamental understanding of our oceans by investigating oceans on other worlds.

Mentoring: I aim to train the next generation and reduce under-representation in NASA Earth science by developing effective mentoring relationships with students and post-doc collaborators. Although I'm an early career PI (9 years from PhD), my aim is manifest in 12 mentoring relationships with partners bringing a wide range of different identities spanning gender, racial/ethnic group, national origin, and veteran status. As a scientist at national labs, most of my mentee partners have been near peers. In addition, my mentoring relationships have not been traditional dyadic student-advisor or student-teacher relationships. Rather, mentorship has mostly occurred in the context of collaborative projects with personnel at many career stages, multiple institutions, varied technical expertise, and various identities and cultural backgrounds. The modes of communication are also quite varied, ranging from traditional sustained in-person advising or semester internships to intermittent visits and virtual collaborations. These relationships also cover different mixtures of social activities typical of friendships, technical collaboration, and discussion of career experiences and possible solutions. Yet, I always try to set clear expectations and priorities, develop good rapport, and trust, and maintain open communication. This means being available and engaged (active listening and engagement).

To increase the odds of success, I invest some time educating myself on diversity, equity, and inclusion issues in general and in mentoring best practices in particular (I served on a DEI committee at NCAR). I also develop mentoring relationships with awareness of social justice issues and cultural issues that project onto mentoring relationships. Finally, I regularly reflect on the relationship, and I bring in third parties from the institution or externally to address difficulties or limitations in these relationships.

The bottom line is that I would be thrilled to welcome new students and post-docs to join me in my quest to study the oceans in our changing climate at NASA, especially those from under-represented groups. And I will do my best to learn from them, include them in my work, and ensure they feel welcome, respected, and engaged in our joint quest to discover the mysteries of the oceans, on Earth or another world.

Websites: http://danielwhitt.github.io

Name: DAVID LEISAWITZ

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NASA Center: Goddard Space Flight Center

Institutions: Any institution that's eligible to apply to NASA's Bridge Seed Funding program.

SMD Division: Astrophysics

Keywords: astrophysics, far-infrared, interferometry

Research: My research is relevant to the Astrophysics Division and aligned with the NASA Astrophysics Roadmap ("Enduring Quests/Daring Visions," see https://smd-prod.s3.amazonaws.com/science-red/s3fs-public/atoms/files/secure-Astrophysics_Roadmap_2013.pdf) recommendation to develop space-based interferometry starting in the far-infrared. A far-infrared interferometry mission will provide unprecedented image resolution and enable new understanding of galaxy evolution and planetary system formation (see https://asd.gsfc.nasa.gov/spice/science.html).

A potential research project for a student would involve running simulations of the far-infrared sky based on existing computer code and predicting how a conventional telescope and an interferometer would "see" the sky. Such simulations will quantify the limitations of a single-aperture telescope (as a function of its size) and bolster the case for an interferometer, helping us to decide how long the interferometer's maximum baseline length should be.

Mentoring: I have been mentoring students throughout my 30-year career as a NASA civil servant. Those students have ranged from high school through postdoctoral and also include early-career civil servant scientists. I'm proud to have been awarded the 2009 "Co-op Employer of the Year Award" from McMaster University. I consistently emphasize diversity and inclusion in the teams I form and lead and value the formal leadership training I've had, including Harvard Kennedy School of Government's "Leadership Decision Making" course and, most recently, a class on "Overcoming Accent Bias for Leaders." I would very much like to partner with someone on a Bridge Seed Funding proposal. As Chief of Goddard Space Flight Center's Science Proposal Support Office since 2006 I am very familiar with NASA's ROSES proposal programs and proposal-writing skills and would like to share my knowledge with the proposal PI.

Websites: https://asd.gsfc.nasa.gov/spice/science.html

Name: Donguk Yang

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NASA Center: Glenn Research Center

Institutions: Any or all, if available, Navajo (Diné) Nation Serving institutions.

SMD Division: Earth Science,Planetary Science

Keywords: Radioisotope power systems, Attitude control system, High-temperature power electronics, Venus missions

Research: My research interests include 1) radioisotope power systems for planetary science and human landing missions and 2) high-temperature power electronics for Venus missions.

1) I primarily work on design and development of controllers for free-piston Stirling convertors for space power generation. Furthermore, main objectives of my Ph.D. thesis was to study the environmental effects on inertial sensors and design and develop a packaging technology to mitigate those effects. The radioisotope power system uses radioisotopes, such as Pu-238, to generate heat via its radioactive half-life. The generated heat is then converted to electrical energy by Stirling convertors. Compared to the current state-of-the-art technology, enhanced Multi-Mission Radioisotope Thermoelectric Generator (eMMRTG), this technology shows a higher thermal-to-electricity conversion efficiency by a factor of 4-5 (i.e., 30% vs 6%). As a result, this technology has been a great candidate to generate electrical power in space for future flight missions. Through the SMD bridge program, I'd like to collaborate with a faculty (or faculties) and students to demonstrate this technology in the Low Earth Orbit (LEO) using concentrated solar power system to replace the radioisotope-based heat source to heat up the Stirling convertors for this technology demonstration. The main work will be a) to research a proper concentrated solar power system, b) to develop an attitude control system to track the Sun, and c) to integrate Stirling convertors, controllers, and concentrated solar power system.

2) I also worked on a proposal as a co-PI to design and fabricate 500degC 1kW bipolar junction transistors (BJTs) and another proposal as the controller lead to develop a controller for Stirling convertors that can survive at 500degC for Venus landing missions. As I was collaborating with a high-power/high-temperature electronics company, they expressed that changing some material in one of their products can make it survive at 500degC for an extend period of time, and the estimated cost was within the budget of the SMD Bridge program. Therefore, through the SMD bridge program, we can collaborate with the electronics company to modify and obtain those devices, and perform testing under Venus environments at NASA Glenn Research Center or another capable facility. Furthermore, long-term characterization testing of temperature sensors at high temperature is another good research topic for Venus missions.

Mentoring: Please note that while I work at GRC (Cleveland, OH), I can also support faculties and students in Houston, TX. My main objectives are 1) to involve faculties and students from underserved institutions in NASA's critical research areas for flight missions by suggesting appropriate ideas that can be accomplished within 2 years and $300k, 2) to help them learn and grow personally and professionally by accomplishing important research outcomes to contribute to NASA's future missions, and 3) to build good long-term relationships with them such that they can further contribute to NASA whenever opportunities arise.

To achieve these objectives, I'm planning to have brainstorm sessions with faculties and students to determine the topic and the scope of the project considering our capabilities, budget, timeline, and students' availability. After that, we can assign tasks to each person and have weekly or bi-weekly tag-ups to update on our progress while another monthly or bi-monthly tag-up to discuss their current coursework progress and any difficulties in their lives that need some attention for successful graduation. Furthermore, I'd like to give them a quick presentation on my life journey to NASA and my future plans. Finally, I'd like to host people to my place to have dinner whenever we get a chance and spend time together to get to know each other better.

Websites: https://www1.grc.nasa.gov/research-and-engineering/thermal-energy-conversion/

Name: Driss Takir

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NASA Center: Johnson Space Center

Institutions: All

SMD Division: Planetary Science

Keywords: Asteroids, Meteorites, Asteroid samples, Spectroscopy, Planetary Science Missions

Research: My research at NASA JSC involves the analysis of primitive extraterrestrial materials and characterizing primitive asteroid surfaces to constrain the abundance and distribution of volatiles and chemical compounds across the solar system. My research includes using laboratory experiments to simulate space conditions for spectral analysis of water- and carbon-rich extraterrestrial samples, including carbonaceous chondrite meteorites and carbonaceous asteroid-returned samples (e.g., Ryugu), to study their compositions. I use reflectance spectral experiments in the laboratory that cover the Visible (VIS) and Near-infrared (NIR) spectral range under asteroid-like conditions to characterize the mineralogy and chemistry of these primitive materials that are the building blocks of our solar system.

My research also involves astronomical observations in the VIS and NIR spectral range of water- and carbon-rich asteroids. I use these bodies' ground- and space-based observations to characterize their surface composition and study their connections to water- and carbon-rich meteorites and asteroid-returned samples. Some of the telescopes I use in my research include the NASA Infrared Telescope Facility in Hawaii and the James Webb Space Telescope.

In addition, I have been part of several planetary science missions to explore water- and carbon-rich bodies in the solar system. My research includes processing and analyzing spacecraft data to help answer some of the key questions about the source of volatiles and chemical compounds in the solar system and how these materials may have led to the formation of life on Earth.

My research uses multifaceted approaches, including laboratory experiments and astronomical observations involving water- and carbon-rich planetary materials to advance NASA's goals, which are relevant to understanding the formation and evolution of the early solar system. My research addresses questions covered by NASA's Planetary Science and Astrobiology Decadal Survey 2023-2032, including Question 1.1: "What Were the Initial Conditions in the Solar System?", Question 3.1, "How and When Did Asteroids and Inner Solar System Protoplanets Form?", and Question 10.2c, "What Can Small Bodies Reveal About Habitability?"

Mentoring: I use an interdisciplinary approach in my mentorship projects, for example, one of my first projects involved modeling the shape of the asteroid (3) Vesta. I encouraged my high school mentees to apply interdisciplinary concepts that involved geology, astronomy, computer science, math and geometry, and physics to develop a 3-dimensional model of this asteroid. Using active mentoring techniques with my previous mentees (undergraduate and graduate students and post-docs) led to enjoyable and extraordinary mentorship outcomes. When I regularly meet with my mentees, I foster an environment of active listening and talking, encouraging them to process information when they ask or answer questions actively. Whether working on a project that involves laboratory experiments using extraterrestrial material samples or astronomical observations of primitive asteroids, I always give my mentees enough time to absorb the project aspects and goals and connect them to what they have already learned. This leads the mentees to develop higher-order thinking skills and become more aware of their thought processes and understanding of the overall project. Active mentorship philosophy helps my mentees activate their prior knowledge and organize their thoughts and ideas before sharing them with me and their peers. In my experience mentoring students and post-docs, I have found that some excel with little interactions, whereas others do better with more interactions. I can adapt to the needs of each mentee and improve my ability to identify the best approach for everyone. My general approach is to provide a high level of guidance during the beginning of the mentorship projects but then allow more room for advanced mentees to be more deeply involved in the project.

My mentoring experiences demonstrate my commitment to Inclusion, Diversity, Equity, and Accessibility (IDEA) and align with NASA's philosophy, which aims to understand and overcome barriers faced by underrepresented communities in planetary science. In my own previous experience as a student and postdoc, I struggled with networking and finding research and funding opportunities. Therefore, I understand these barriers. That is why I am committed to continuing my efforts to actively seek opportunities in my research for individuals from historically underrepresented backgrounds to enhance IDEA in planetary science within NASA.

Websites: https://ares.jsc.nasa.gov/people/bios/driss-takir/

Name: Eleanya Onuma

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NASA Center: Goddard Space Flight Center

Institutions: Morgan State University (School of Enginnering)

SMD Division: Astrophysics,Heliophysics,Earth Science,Planetary Science

Keywords: Quantum Network, Quantum communication, Quantum Positioning, Navigation, and Timing (QPNT), Machine Learning (ML), Artificial Intelligence (AI)

Research: Quantum networks leverage principles of quantum mechanics to generate, transmit and process information across networks. Its relevance to astrophysics lies in enabling secure communication over vast distances, aiding in data transmission from telescopes or satellites. Earth science benefits from improved sensors and secure data transfer for monitoring environmental changes. Heliophysics can benefit from enhanced communication for solar observations, while planetary science can leverage quantum networks for interplanetary communication and remote exploration.
Potential quantum networking areas of research for an undergraduate student include:
1. Quantum Cryptography Implementation: Building practical implementations of quantum cryptography systems and testing quantum safe encryption methods for secure data transfer over long distances vital for space missions.
2. Quantum Teleportation Experiments: Understanding and testing quantum entanglement for the transmission of quantum states, relevant for both astrophysics and planetary science.
3. Quantum Network Simulation: Designing simulations to understand the behavior of quantum networks under various conditions, providing insights into their functionality and limitations.
4. Quantum Cryptography Implementation: Building practical implementations of quantum cryptography systems for secure data transfer relevant to comm and Nav. research.
These projects offer undergraduates opportunities to contribute to advancing quantum networking while gaining valuable hands-on experience in cutting-edge research.

Mentoring: TBR

Websites:

Name: Elison Blancaflor

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NASA Center: Kennedy Space Center

Institutions: Primarily Undergraduate Institutes (PUIs), Minority-Serving Institutes, HBCUs

SMD Division: Biological & Physical Sciences

Keywords: Plant Biology, Space Crop Production, Botanical Microscopy

Research: I am interested in gaining a mechanistic understanding of the cellular and molecular pathways by which plants grow and develop. For the most part, I use conventional and advanced microscopy techniques to visualize the intricate structures and dynamics of plant cells and ask how information processed at the cellular level directs specific growth responses at the organ and whole plant level. My research combines microscopy with genetic, genomic, and biochemical approaches using model plants and crops. Regarding Science Mission Directorate (SMD) relevant topics, I am interested in how plants respond to microgravity and various spaceflight environments, with the ultimate goal of translating this knowledge into strategies for sustainable crop production systems to support the nutritional/life support needs of humans during long-duration space missions.

Mentoring: I joined NASA-Kennedy Space Center (KSC) in July 2022 after more than twenty years of leading an active plant biology research laboratory at a private non-profit agricultural research organization called the Noble Research Institute. There I had the privilege of training and mentoring undergraduate and graduate students, and postdoctoral fellows from various nationalities/backgrounds. A large part of directing a research laboratory involved training mentees on various cell and molecular techniques as they apply to plant biology and editing student/postdoc manuscripts for scientific publication. Several of the students/postdocs who I mentored have moved on to independent academic, government or industry positions or are pursuing graduate studies in science. I continue to mentor early career scientists and postdocs at KSC and hope to resume mentoring undergraduate students through the NASA-SMD-BRIDGE program on topics related to plant and crop research as it applies to space agriculture. To generate an inclusive environment, my approach has first been to make sure that the lab has well-planned on-boarding processes. Formal and informal check-ins will be large part of my mentorship plans to make sure that students feel a sense of belonging. Having regular meetings to discuss progress is a typical part of running a research program. To ensure that students are engaged, feel welcome, and respected, I typically abide with the following practices during meetings:1). Meetings are started on time or within an agreed upon norm, 2). Time is allotted for informal check-ins unrelated to the project, 3). Feedback is encouraged and appreciated, 4). Positive personal moments related or unrelated to work (e.g., birthdays, completion of an advanced degree, and achievement of major project milestones) are celebrated, 5). Team members regardless of their roles/position are afforded equitable speaking time, and 6). When conflict arises and emotions enter the space, they are acknowledged and addressed.

Websites: https://www.linkedin.com/in/elison-blancaflor-2609813

Name: Emily Wilson

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NASA Center: Goddard Space Flight Center

Institutions: Colleges, Universities, Small businesses, Non-profits

SMD Division: Astrophysics,Heliophysics,Earth Science,Planetary Science,Biological & Physical Sciences

Keywords: atmospheric trace gases, lunar, planetary, Earth, infrared, cross-cutting instrument development, CubeSat, ground instrument, laser heterodyne radiometer

Research: I develop instrument payloads that measure trace gases in Earth and Planetary atmospheres to study climate change and search for life and habitable worlds. Instruments typically measure mole fractions in the infrared by passively (using sunlight) or actively (using a laser) measuring absorption features of gases. The payloads that I develop have been used for ground observations, and deployed on aircraft and CubeSat platforms. Some instrument techniques that I have worked with include tunable diode laser absorption spectroscopy, laser heterodyne radiometry, Fabry-Perot Interferometry, Fourier-transform spectrometry, LIDAR, mass spectrometry, and gas-correlation radiometry. I enjoy working with students on end-to-end instrument development - especially designing low-cost, quick turn-around instruments with commercial components.

Mentoring: My mentoring approach involves getting to know a student's interests and abilities and then collaboratively developing projects with them with components that they will have instant (or near-term) success with as well as some components that will be more challenging and somewhat out of their comfort zone so they have room to grow. I've been lucky to have interns work with me throughout my time at NASA. Interns have made significant contributions to the build of my ground instruments and CubeSat payload. Students learn about spectroscopy, optical design, printed circuit board design, CAD design, machining, thermal-vacuum and vibrational testing, field testing, data analysis, and proposal writing. I strive to keep an upbeat, positive research environment that is inclusive and never antagonistic.

Websites: https://earth.gsfc.nasa.gov/acd/instruments/mini-lhr

Name: Erin Lalime

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NASA Center: Goddard Space Flight Center

Institutions: Any

SMD Division: Planetary Science

Keywords: Planetary Protection, microbiology, molecular biology, biodiversity, bioburden, contamination

Research: Planetary Protection is the practice of ensuring that our spacecraft do not contaminate other planetary bodies with earth origin microorganisms (forward planetary protection) and that any missions returning samples to Earth are safely contained to prevent uncontrolled release of potentially harmful biological materials. Research into improved detection, characterization, and removal of microorganisms from spacecraft and cleanrooms is a key will be key to supporting future missions to sensitive planetary bodies, particularly icy moons.

(Also relevant to biological and physical sciences)

Mentoring: Strong and open communication is the heart of my mentoring strategy whether mentoring undergrads, graduate students or peers. Its important to gauge where a mentee is in their learning process and give them room to grow independently but with sufficient check-ins and support. When mentoring in my lab I am initially very hands on, with a transition to more independence as the mentee gains skills.

Websites:

Name: Geoffrey Bomarito

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NASA Center: Langley Research Center

Institutions: Any

SMD Division: Astrophysics,Heliophysics,Earth Science,Planetary Science,Biological & Physical Sciences

Keywords: Uncertainty quantification, Machine learning, Model calibration, Rare event simulation, Symbolic Regression

Research: Uncertainty quantification (UQ) stands as an indispensable tool across SMD divisions, offering a universal key to advancing scientific rigor and precision. In astrophysics, it ensures the accuracy of celestial observations and simulations, providing confidence in our understanding of cosmic phenomena. In biological and physical sciences, UQ enhances the reliability of experimental results, critical for unraveling complex biological processes and refining molecular-level models. Earth science benefits from UQ by improving the precision of climate predictions and supporting decision-making on climate change and natural disasters. In heliophysics, UQ is essential for predicting space weather phenomena, safeguarding space missions and satellite operations. Planetary science relies on UQ to interpret planetary data and refine models, crucial for successful exploration missions. As a cross-cutting technology, UQ is the linchpin for robust and trustworthy scientific endeavors, empowering researchers across SMD divisions to navigate uncertainties and push the boundaries of knowledge in their respective fields. The primary interest this group is in the development of UQ techniques such as model calibration methods, multifidelity UQ, and rare event simulation.

Special interest is also given to the field of machine learning (ML) because it has become an integral part of the UQ workflow. Specific topics of interest in machine learning would be the use of generative modeling as a form of UQ, symbolic regression for surrogate modeling, and any other ML methods that are tightly integrated with UQ techniques.

Mentoring: The team has extensive experience mentoring students and supporting underserved communities through internships and participation in programs such as Minority University Research & Education Project (MUREP), STEM Takes Flight, and NASA Community College Aerospace Scholars (NCAS).

Students typically participate in an onboarding process that involves lecture-style presentations on state-of-the-practice in software development with a focus on Python, version control, and best practices for writing clean scientific software. A getting-started project is also used to help put topics covered in the lectures into practice as well as introduce important research ideas/topics. There are two scheduled "standup" meetings per week with students to discuss progress and identify roadblocks. Long form meetings are scheduled on an as-needed basis and can include working meetings where mentors and students work together to solve problems.

Websites:

Name: Gregory Mosby

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NASA Center: Goddard Space Flight Center

Institutions: I'm interested in partnering with any size/type institution. I identify as Black and am a member of the American Astronomical Society, the National Society of Black Physicists, and the Society of Photo-Optical Instrumentation Engineers.

SMD Division: Astrophysics

Keywords: galaxy evolution, detectors, machine learning, instrumentation, observational astronomy

Research: My research areas cover astronomy instrumentation and observational astronomy, and this includes using interdisciplinary approaches to both, i.e. using engineering, applied math, statistics, and machine learning techniques. My observational studies typically center around extragalactic astronomy, examining galaxy evolution through spectroscopy of galaxies using ground based and space based telescopes. I would be interested in partnering on projects reviewing large data sets of archival spectroscopic data of galaxies or collaborating on telescope proposals to obtain follow-up or more detailed observations of select objects. My interests are in studies that help piece together the life cycles of galaxy evolution and tackling difficult observations with new techniques and instrumentation.

My instrumentation interests typically involve detector and sensor technology. I am involved in and have experience in instrumentation on various platforms and scales: ground-based, PRIME telescope (microlensing and large FOV photometry), SmallSat Pioneers mission, Pandora (exoplanet transit spectroscopy with simultaneous host star brightness monitoring), and the flagship mission, the Nancy Grace Roman Space Telescope. I am particularly interested in the development of sensors that might enable near zero or zero read noise detection of astronomical sources for new astronomical instruments and telescopes, for example, the upcoming Habitable Worlds Observatory. These studies could include new materials for sensors or novel read out electronics for existing materials or sensors.

Mentoring: My mentoring approach is to be open, thoughtful, and responsive. I approach mentoring with an open mind because I recognize mentoring as a partnership. To get the most out of a partnership, it is best to resist the tendency to pre-judge which may blind partners to new approaches or solutions. It is also important to be clear about expectations. As mentoring is a partnership and no two partnerships are alike, I approach my mentoring by being thoughtful of the individual. I am mindful and respectful of my mentees and partners as people first, and we work together to make sure we all achieve what we agree is success for us. Part of being thoughtful and in order to have a successful partnership, it is key to be responsive. I strive to be a clear, consistent communicator. And I also aim to be agile and flexible in order to adapt to changing circumstances and surprises. How responsive you are can make or break a team as members depend on one another to make progress.

Websites: https://science.gsfc.nasa.gov/sci/bio/gregory.mosby

Name: HARRY SHAW

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NASA Center: Goddard Space Flight Center

Institutions: any or all

SMD Division: Biological & Physical Sciences

Keywords: Quantum computing communications materials

Research: I am the Principal Investigator for quantum communications and computing in the GSFC Exploration and Space Communications Division (Code 450). I run two quantum communications research labs, participate in the development of the GSFC quantum networking node, a research area in quantum computing. I have a team of 10 researchers including Ph.D., leads in our research areas, and graduate students

Mentoring: My group participates in the NASA intern program. We have interns that gone from graduate school, post-doctoral work, and then full-time work at GSFC. All our quantum interns have a chance to perform a wide range of experiments such as quantum key distribution Michelson Interferometry, quantum entanglement, verification of entanglement, development, and testing of quantum computing concepts. I maintain partnerships with a variety of universities that provide us a pipeline of qualified students to work on quantum projects and experiments at GSFC

Websites: https://www.hshawdsc.net/

Name: Hazem Mahmoud

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NASA Center: Langley Research Center

Institutions: all

SMD Division: Earth Science

Keywords: Air Quality, Aerosols, Trace Gases, Clouds, Lidar, Wildfires, Glaciers, radiation budget

Research: As an Earth Scientist, Geophysicist, and Environmental Engineer currently focusing on applying Geospatial data and Remote Sensing methods to all the mentioned areas, mainly to address climate change challenges and assure safety and well-being of people, I pursue a multi-disciplinary research agenda in which the following fields comes as a priority: 1) Remote Sensing and geospatial data applications: a) Wildfire impacts on vegetation, air quality, b) Geodetic glacier mass balance calculation and glacier retreat impact on water resources, c) Sustainable cities: population grid data estimates, and accuracy comparison with Non-governmental organization (NGO) data on slums, d) Environmental impact and hazards on population from natural disasters like earthquakes, landslides, flooding and wildfires e) Toolkit Development for sustainable cities and human settlements for United Nations sustainable development goal 11.

Mentoring: Creating an inclusive and supportive mentoring environment is crucial for the success and well-being of all participants involved in research endeavors. Here's a description of a mentoring approach that fosters inclusivity, respect, and engagement:

Open Communication: Foster an atmosphere where open and honest communication is encouraged. Students should feel comfortable discussing their ideas, concerns, and challenges. Regular check-ins and active listening are essential components of this approach.

Respect for Diverse Perspectives: Acknowledge and celebrate the diversity of backgrounds, experiences, and perspectives among the participants. Respect for different viewpoints enriches the research process and leads to more innovative solutions. Encourage students to share their unique insights and learn from one another.

Encouragement and Empowerment: Provide positive reinforcement and encouragement to students. Acknowledge their achievements, both big and small, and empower them to take ownership of their research projects. Instill confidence in their abilities and offer guidance when needed.

Individualized Support: Recognize that each student is unique, with varying strengths and areas for improvement. Provide tailored guidance and support based on individual needs and goals.

Some students may require more assistance in certain areas, and a personalized approach ensures that everyone receives the help they need.

Collaborative Learning: Foster a sense of community and collaboration among students and faculty members. Encourage collaborative learning experiences where students can work together on projects, share knowledge, and learn from one another. Collaborative environments often lead to creative problem-solving and mutual support.

Feedback and Growth: Provide constructive feedback to help students improve their research skills. Encourage a growth mindset where mistakes are viewed as opportunities to learn and grow. Celebrate the progress made over time and help students set realistic goals for continuous improvement.

Websites:

Name: Heather Graham

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NASA Center: Goddard Space Flight Center

Institutions: 4 year MSIs

SMD Division: Planetary Science

Keywords: Biosignature definition and strategy. Chemical biomarker preservation.

Research: My research is concerned with the fundamental scientific development of novel biosignature detection methods using the tools of organic geochemistry in a wide variety of sampling environments.

My two major areas of research are chemical complexity, and generalized stoichiometry. Indices that attempt to describe molecular complexity are often arbitrary, based in perception, and usually rely on just a few particular molecular features: number of bonds, number of edges, molecular weight, cyclicity, heteroatoms, etc. With colleagues, I am exploring new ways to define organic molecule complexity that help to differentiate biological vs abiotic organic chemistry. Both systems are capable of producing very large organic molecules across a wide variety of compound classes. However, organic chemistry occurring in abiotic settings (stars, asteroids, deep hydrothermal vents) generally create very large polymers without great variation. Instead of starting with pre-determined molecular features as an index of complexity we examine fragmentation data from tandem mass spectrometry. Without parsing the population of molecules in each setting, we use fragmentation mapping in mass spectrometry as a rough approximation of bond number. This value maps if there is a difference in the number of non-iterative reaction steps that can be seen as a threshold for a biological molecule rather than an abtiocially sourced organic.

On the more inorganic side

patterns of elemental or isotopic accumulation that differ from the general background have been used as a basic description of a cell. By extension, the observation of a accumulation or fractionation that differs from the surrounding environment could be defined as a biosignature. This expression is preserved in filtered cells and can also be observed in cellular remains preserved in the sedimentary record. Relying first on theoretical models we are exploring the relationship between cell/particle size, cell/particle stoichiometry and the fluid or environmental stoichiometry. Preliminary data has shown relationships that link these parameters in N/P space. Future work is mapping ratios of other biologically important trace metals as well. The purpose of this work is not only to identify universal biosignatures but as a way of thinking about “Redfield ratios” for other oceans. The regularity of these ratios is connected by ecological dynamics and cell physiology and could indicate alternate important chemical systems.

Mentoring: My current lab group is a diverse and lively assemblage of eager scientists committed to working together. We are from four different countries, with five different languages and a variety of gender and sexual identities. Making our complete identities part of our working culture is how I try to foster a collegial environment that blends in to my inclusive mentorship approach. We try to see the science that happens in the lab as part of group activity where we value our colleagues input and understand that our scientific success is incumbent on all of us being engaged fully and allowed to grow as researchers. Learning and comfort as learners is a big part of our group dynamic. Questions are welcome and answers are given freely and openly. As much as group activity is part of our research ethos I also strive to make sure that each person has their individual science footprint and specialty, the thing that they can maintain as their expertise and focus. This prevents strife and also lightens the load so that there are clear internal experts for the wide variety of tasks we perform. I welcome new people with new ideas and perspectives to be part of our group and hope that we can learn and teach together to unravel this mysterious thing that is life in the Universe.

Websites:

Name: Hyunju Connor

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NASA Center: Goddard Space Flight Center

Institutions: All institutions, including those in northern states (e.g., Washington, Montana, North Dakota, Minnesota, Wisconsin, Michigan, Ohio, New York, etc.), are considered ideal for space weather research. However, any location will provide a unique dataset.

SMD Division: Heliophysics

Keywords: student-built magnetometer array, space weather, geomagnetically induced currents

Research: Geomagnetically Induced Currents (GICs) are electrical currents induced by fluctuations in the Earth's geomagnetic fields during dynamic Sun – Earth interactions. GICs can flow through power systems, pipelines, and other conductive structures, posing a risk to electrical infrastructure. The impact of GICs includes power grid instability, transformer damage, and potential disruptions in communication systems. Monitoring and understanding GICs are crucial components of managing and mitigating the impacts of space weather hazards on critical infrastructure. The Space Weather UnderGround (SWUG) program aims to enhance the understanding and prediction of GICs by providing cost-efficient, high-resolution geomagnetic field data.

The SWUG program offers students hands-on experience in the Science, Technology, Engineering, and Mathematics (STEM) field. In this program, students construct a cost-efficient, research-capable array of magnetometers across the United States, collect time-varying geomagnetic field data in response to dynamic space environments, and contribute to NASA Heliophysics missions and space weather research. Initiated by Charles Smith at the University of New Hampshire, this SWUG program was later expanded by Hyunju Connor to the University of Alaska Fairbanks and the NASA Goddard Space Flight Center.

The following tasks are suggested for a 2-year NASA Bridge Seed Funding program with 1 faculty and 1-2 students:

1. 1st Fall Semester: Assemble and test an off-the-shelf magnetometer kit with a SWUG manual.
2. 1st Spring Semester: Build and test a waterproof deployment vessel with a SWUG manual.
3. 1st Summer: Participate in a student internship at NASA Goddard, calibrate and analyze a student-built magnetometer vessel, support a SWUG high-school summer program.
4. 2nd Fall semester: Deploy a magnetometer vessel in the student's institute's state, collect and upload geomagnetic field data to a SWUG data center, build an additional magnetometer vessel, incorporating lessons learned.
5. 2nd Spring semester: Calibrate and analyze the SWUG data, test and deploy the additional vessel in the student's institute's state, document institute-specific modifications in the SWUG manuals.

6. 2nd Summer: Participate in a student internship at NASA Goddard, analyze geomagnetic field data across the entire SWUG network, support the SWUG high-school summer program. If desired, a faculty may initiate a high-school summer program in their institution.

Mentoring: The student will interact with Dr. Connor and her SWUG team on a regular basis. During semesters, Dr. Connor will schedule bi-weekly meetings with a faculty member and a student to guide and discuss project progress. She will also invite them to the monthly SWUG meeting where they can meet other SWUG members, familiarize themselves with NASA SWUG activities, and seek advice on any issues they face.

A student will participate in the NASA summer internship program. During the first couple of weeks, Dr. Connor will give the student a personal lecture on heliophysics and the SWUG program, discuss expectations of the internship, and introduce NASA intern resources/events. Then, Dr. Connor and the student will schedule a 15min tag-up meeting every day to check daily progress and provide timely feedback. If she is traveling, another SWUG team member at Goddard will be assigned to guide the student. The student will also join a monthly SWUG meeting and take a leading role in organizing a 1-week high school student program under the guidance of Dr. Connor and her team. Finally, Dr. Connor will encourage the student to give a final presentation at the NASA intern workshop scheduled at the end of the summer internship.

Websites: https://science.gsfc.nasa.gov/sci/bio/hyunju.k.connor

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NASA Center: Ames Research Center

Institutions: any

SMD Division: Astrophysics, Heliophysics

Keywords: the Sun, stars, modeling, observations, theory

Research: My research interest covers a variety of topics in Heliophysics and Astrophysics, which includes hydrodynamic and MHD modeling, analysis of observations from NASA space missions and simulations, development and implementation of new data analysis techniques and data environments, enhancement of predictive capabilities of different phenomena.

Potential projects can cover the following topics:

- Analysis of 3D HD and MHD realistic radiative models of the Sun and stars
- Investigation properties of different types of waves, mechanism of their excitation, and propagation through the highly stratified medium
- Investigation formation, dynamics, and properties of vortex tubes
- Synthesis and analysis of observational data
- Develop predictive capabilities of solar activity on long (solar cycles)
- Development of new data analysis capabilities (e.g., data assimilation, ML)
- Investigation of structure and dynamics of the Sun and stars from interiors to corona

Mentoring: I am interested in developing collaboration with different research groups and individual scientists, exchanging expertise and experience, advancing scientific understanding of different phenomena, and supporting the development of a new generation of scientists. My general approach is to build an open environment that allows each team member to feel engaged, supported, and valued. The collaborative environment with and between students is a synergy of targeting specific project goals, professional development, and exchanging expertise and experience. In addition to developing new skills, it is important to learn how to think outside of the box, develop a strategic vision in formulating and prioritizing tasks, as well as ability to learn from other fields.

Websites:

Name: JAMES CARPENTER

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NASA Center: Goddard Space Flight Center

Institutions: 4-year HBCU or hispanic-serving institution

SMD Division: Planetary Science

Keywords: mission operations, navigation, data science

Research: To paraphrase a definition from Wikipedia, the goal of this research is extracting knowledge from large data sets consisting of spacecraft housekeeping telemetry and applying the knowledge and insights from that data to solve mission operations problems. I have listed Planetary Division above, but the data set includes missions from Planetary, Heliophysics, and Astrophysics Division missions.

Mentoring: I have mentored dozens of students over many years, from a diverse set of backgrounds and life experiences. I can't think of a single one who has not gone on to great success. My approach is founded on a few key ingredients: mutual enthusiasm for our work, mutual respect for each other, creating an environment where honesty and trust flourish, and nudging my students just enough when they need help, while allowing them own their projects.

Websites:

Name: JAMES SPACKMAN

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NASA Center: Ames Research Center

Institutions: Any and all that want to pursue exciting new science.

SMD Division: Earth Science

Keywords: Aerosols, trace gases, air quality, weather, climate.

Research: I conduct and facilitate novel research in several societally-relevant weather and climate topical areas, with a keen interest in interdisciplinary approaches to addressing hypothesis-driven science:
- Chemistry and dynamics of the stratosphere (e.g, associated with changes in water vapor, ozone, aerosols).
- Regional and global air quality, with an emphasis on intercontinental transport of pollution (e.g., black carbon, carbon monoxide).
- Observation and improved prediction of extreme phenomena (e.g., wildfires, atmospheric rivers).

Mentoring: I approach mentorship with an emphasis on passion for discovery and empowerment to accomplish. I tailor mentorship to individual knowledge and expertise and incentivize engagement in research activities so all participants can achieve success that fosters and cultivates career growth.

Websites: https://www.nasa.gov/people/ryan-spackman-phd/

Name: Jared Broddrick

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NASA Center: Ames Research Center

Institutions: Any, but HBCUs in particular.

SMD Division: Planetary Science,Biological & Physical Sciences

Keywords: astrobiology, metabolism, biochemistry, modeling, bioengineering

Research: I am a computational systems biologist leveraging metabolic modeling to solve problems relevant to all NASA life science objectives. The primary tool I use is genome-scale metabolic modeling, a systems biology approach that has had great success in characterizing and engineering organisms at all scales-from microorganisms to humans. I am currently building these models to characterize the interaction between life and its environment with a focus on astrobiology and life detection. Additionally, I am exploring these tools to assist in life-based engineering solutions to long-duration human spaceflight.
My primary hope with this program is to use these computational tools as a framework to teach students biochemistry, basic computational modeling, and an introduction into bioengineering-all from the perspective of NASA life science research. While outright research proposals are also of interest, I've been hoping to use NASA life science research to supplement classical biochemistry curriculum towards an introduction to computational modeling and bioengineering. The baseline framework would be to choose a NASA-relevant organism and walk through the process of building a metabolic model and simulating the interaction of that organism with its environment. Potential areas of learning include: field site sampling, microbial culturing, genomic DNA extraction, DNA sequencing, genome assembly and annotation, biochemistry and metabolic network analysis, modeling in Python.

Mentoring: My mentoring approach largely stems from my time participating and leading teams over 21+ years of service in the military. In particular, experience while being a part of diverse teams. Both NASA and the military have worked hard to give traditionally marginalized groups a "seat at the table." But I've learned a seat hasn't always translated to having a voice. A young airman joined my team and despite unparalleled job performance, he was a lower rank and had plateaued for several years. Upon inquiry, I was told he tended to be "too vocal at inopportune times." I found that he was vocal when our actions were inconsistent with our principles. He had a high standard of excellence because of combat experiences where mistakes cost lives. His intensity was the burden of mistakes. Thinking PTSD would create sympathy not condemnation, it appeared racial discrimination also played a part in how his actions were perceived. Personally, I found his experiences made him empathic and morally centered. I promoted him immediately and leveraged his perspectives to help cover blind spots in my leadership style.
I've often heard these individuals be told to "speak up" about their challenges. However, peers have confided in me the emotional and psychological energy required to constantly drag these

challenges into the light and share them openly. This puts a double burden on these individuals as they often must step away from their work to recharge.
Thus, my mentorship approach is about support and advocacy. I've found that I can advocate and relay these challenges on their behalf, leveraging my position and the fact that I come from a group that typically has a seat and voice. This combination of empathy and advocacy is something I will champion in any team to which I have the privilege to participate.

Websites:

Name: Jason Derleth

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NASA Center: Goddard Space Flight Center

Institutions: Minority Serving Institutions, Community Colleges

SMD Division: Astrophysics

Keywords: space telescope technology, digital engineering

Research: I am the Chief Technologist for the Physics of the Cosmos and Cosmic Origins programs. I primarily support the technology development that is going into the next flagship astrophysics space observatory, the Habitable Worlds Observatory. This includes being a part of a team that is assessing various architectures of the spacecraft and measuring scientific yield for each configuration.

Additionally, I am working with GSFC management on adoption of Digital Engineering. The adoption of MBSE and other forms of more modern systems engineering and development practices has been going slowly at the Goddard campus, and we would like to accelerate adoption.

Mentoring: Mentoring is an active process on both sides of the relationship. The mentor needs to actively understand the needs of the academic being mentored and assist both learning and work in appropriate ways. However, part of the learning needs to be active learning, as well - not just asking questions, but understanding that there are more things to learn than just classroom or proposal activities. Understanding NASA technical jargon, what is expected of a proposer, how a review panel works, why sometimes "good" proposals receive "poor" ratings.

Before my work at Chief Technologist for the PhysCOS/COR programs, I was Program Executive of a technology development program in STMD, the NASA Innovative Advanced Concepts program. Because of this, I have had over a decade of experience running and participating in review panels, and would be able to convey a lot of information about that process to a potential proposer.

This program is especially exciting to me because of its extended nature. Too many people at NASA will reach out to a community once and promise to help. This is somewhat useful, to be sure. However, asking someone to propose to a program in NASA when they have never proposed before is NOT very helpful. What is helpful is following up, repeatedly, to help a proposer understand what went wrong and how to do better in the future. A real mentor works for years to assist in learning not just what happened in a failed proposal bid, but why. From the why comes understanding, and from the understanding comes the ability to do better the next time.

Websites:

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NASA Center: Goddard Space Flight Center

Institutions: any

SMD Division: Planetary Science

Keywords: Organics, planetary environments, ionizing radiation, Mars/Enceladus/Europa, instrumentation

Research: This research is most relevant to the Planetary Science Division with potential research projects including:
* Investigation of organic and inorganic chemical and isotopic changes in planetary analog samples (rocks, sediments, and ice) after exposure to ionizing radiation.
* Investigation of organic and inorganic environmental records retained in ice and details of the how those records are captured, particularly at ice-water interfaces.
* Investigation of organic and inorganic materials entrained in and collected from ice plumes, supported by the Planetary ice Plume Simulator
* Investigation of interactions between gases and icy surfaces in vacuum (as in icy world surfaces).
* Investigations of the process and data capture by hypervelocity impacts of small ice grains onto spacecraft and planetary surfaces.
* Investigations of organic contamination risks and mitigation methods.
* Instrumentation and method development for gas and microfluidic subsystems used with various spectrometric detectors.

Mentoring: Mentoring will be supported with regularly scheduled video or audio meetings to discuss the research effort, how to overcome challenges, lessons learned, and career paths. These will include full research team in addition to some one-on-one student/NASA-CoI discussions. Mentoring in-person will be planned as research sponsored visits to work in the lab on preparing samples for analyses and sample measurements using various methods such as: electrode probes, photometers, , evolved gas analysis, gas chromatography mass spectrometry, and laser desorption mass spectrometry The Planetary Ice Plume Simulator is available to support gas-ice partitioning experiments, and with simulator development, sample collection studies.

Student and faculty opportunities to engage with teams on mission concept and instrument development may be possible.

Websites: https://science.gsfc.nasa.gov/sci/bio/jennifer.l.eigenbrode

Name: Jessica Lee

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NASA Center: Ames Research Center

Institutions: all

SMD Division: Biological & Physical Sciences

Keywords: microbiology, deep space, radiation, microgravity, biology instrumentation

Research: My research focuses on understanding what microbes from Earth experience when they go to space-- especially deep space (beyond Low Earth Orbit), and especially focusing on microgravity and ionizing radiation. Specific areas of interest include: 1) looking at multispecies microbial communities, 2) analyzing microbes at the single-cell level, 3) focusing on interactions between microbes and their physical/chemical environments, 4) developing compact, autonomous instrumentation to help answer biological research questions in deep space. I do both wet-lab experimentation and computational modeling. My ultimate goal is to develop knowledge, experimental tools, and models that will enable us to use microbes to support long-term human exploration of space. In short, we need to understand and predict the effects of radiation and microgravity on microbial systems if we are going to design microbial strains and bioreactors so microbes can make food and drugs for astronauts on the Moon and beyond. My work primarily supports the Space Biology Program in the Biological and Physical Sciences Division.

My background is in microbial physiology, ecology, and evolution, and my strength as a laboratory mentor is in helping students to learn basic microbiology skills (culturing, growth assays, microscopy, flow cytometry), and to learn how to formulate a research question and execute an experiment to answer it (experimental design). I am especially interested in collaborating with other researchers who have expertise in biophysics, fluid dynamics, radiation physics, or mathematical / computational modeling, or engineers interested in building biological hardware for deep space research. I've had great experiences co-mentoring students on interdisciplinary projects in that way.

Mentoring: I have mentored approximately 30 undergraduate and graduate research students in the last 10 years, 18 of them while at NASA. This has included students from a wide range of schools (PUIs, MSIs, R1 institutions) on diverse projects (computational and in the lab, student-driven or dictated by a grant proposal). Fundamentally, my mentoring approach is centered on the needs of the student and depends heavily on the background they bring to the partnership and what they desire to get out of it, so that approach changes each time I work with a new student, and also changes over the course of our relationship as I get to know the student better.

I provide every student with the opportunity to make some decisions around the design and implementation of their project. For students needing more structure, I may provide them with a grant proposal and simply ask them to write a work plan for their portion of the work in their own words, and then to identify the particular learning goals they have for themselves. For those needing more independence, I typically begin with a conversation about the tools and general research questions I have, and then let them come up with their own plan for composing a study using those resources. However, we almost always begin by conducting a simple experiment together with a known outcome to allow the student to get used to the lab (or computational) environment and experience what it's like to get and interpret results. I typically ask lab students to write out an explicit plan for each new experiment they will conduct, to force them to think through each step and give us a chance to discuss ahead of time. For all students, I schedule times to meet on a daily basis-- even if those are very quick check-ins. I generally have pretty multidisciplinary groups of students (biologists, computer scientists, engineers), and hold weekly group meetings to focus on collaboration and science communication (journal clubs, peer-reviewing each others' conference abstracts or exit presentations). I also try very hard to generate some product from every student's work-- whether a software release, preprint, or publication-- within a year or two of their finishing, because I feel strongly about the value of feeling like one has produced something to share with the scientific community. I am looking forward to meeting other investigators through SMD Bridge and working together on co-mentoring plans that fit us and our student(s).

Websites: https://www.nasa.gov/people/jessica-audrey-lee/

Name: Jie Gong

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NASA Center: Goddard Space Flight Center

Institutions: non-R1 University with undergrad computer science/machine learning majors

SMD Division: Earth Science

Keywords: Machine learning application on retrieval algorithm development, explainability and error quantification

Research: Frozen hydrometer microphysical property retrievals and radiative transfer, Machine learning/artificial intelligence applications in cloud and precipitation remote sensing

Mentoring: I like to work with self-motivated students and I have been mentoring summer interns from high school to graduate level during the past 10 years or so. My work is data/modeling centered, so on-site, hybrid or 100% remote all works.

Websites: https://science.gsfc.nasa.gov/sed/bio/jie.gong

Name: John Callas

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NASA Center: Jet Propulsion Laboratory

Institutions: All

SMD Division: Biological & Physical Sciences

Keywords: Fundamental Physics, Atomic Clocks, Cold Atoms, Quantum Entanglement

Research: NASA's Fundamental Physics Program is tasked with addressing the major scientific questions and exploring for new physics by using the space environment to conduct ultra-precise tests of the fundamental laws of physics at levels of precision not possible in terrestrial environments. The current program at the Jet Propulsion Laboratory incorporates research into atomic optical lattice and ions clocks, ultra-cold atoms and atom interferometry, and quantum-entangled systems, among many other quantum-related techniques.

Atomic clocks are both precision timekeepers and ultra-precise sensors. Clocks in space can be use to test the fundamental laws of physics as well as map gravity to exquisite precision. JPL is developing both optical lattice and ion clock technology for deployment in space.

Research with ultra-cold atoms, quantum gases, and atom interferometers provide a wide range of research opportunities. Applications include fundamental physics, such as exploring the nature of dark matter and dark energy, and developing cutting-edge technologies based on quantum mechanics for measuring gravity, navigation, and for magnetic field sensing.

The Deep Space Quantum Link project envisions cutting-edge quantum optical experiments in space making use of long optical baselines or large absolute gravitational potential differences between Earth’s surface and orbit. These experiments range from advancing well-established scientific experiments, such as Bell tests, quantum communication, to completely novel experiments probing the interface of quantum mechanics and general relativity.

The Fundamental Physics program addresses concept development and implementation of key technologies and systems that are required to advance instrumentation and perform quantum-related experiments in space. Projects may include implementation of clocks, cold atoms, free-space optical links, entangled-photon sources, quantum interferometers and among others. Collaborations in this area could leverage JPLs existing know-how of quantum experiments and device integration. Collaborative projects could be pursued directly at JPL or at the faculty’s institution with one or two students. Alternately, collaborative research could be carried out utilizing NASA-funded facilities such as the Cold Atom Lab. Students and faculty from underserved institutions can therefore pursue multiple options for partnership with JPL scientists to support fundamental physics research.

Mentoring: Fundamental physics research and quantum sensing in space requires highly specialized skills that are not typically taught to students even at the graduate level. Therefore, our mentoring program will seek to provide highly motivated students with those specialized skills along with providing a broad technical foundation. This will be accomplished through hands-on laboratory work with leading researchers in state-of-the-art research facilities, participating in mission-critical operations of current and future spaceflight missions, and tutorial instruction in the many sub-disciplines of fundamental physics. JPL operates several state-of-the-art quantum testbed research facilities from optical lattice and ion atomic clocks, cold atom interferometers, gradiometers, to entangled quantum systems that require skills in the areas of quantum optics, classical optics, digital and analog electronics, software development, as well as system engineering. Students will have the opportunity to develop, enhance, and operate these testbeds and acquire these skills in the development of space-based instrumentation for future spaceflight opportunities.

Sound mentoring starts with finding a match between a research project and a prospective candidate or partner which involves a balance between meeting the project needs and respecting the candidate's interests and capabilities. JPL will employ a dynamic mentoring approach in which changes to the project and research are possible throughout the research period. This is especially important for collaborations with students of diverse backgrounds. A high level of support to each student will be provided in the early phases to accelerate development and guarantee a high level of independence later in the project. Although every mentee is different, practical hands-on experience will be an important part of development especially in the early stages. Students will be involved in early-stage prototypes and proof of concepts to gain familiarity with a concept.

Professional networking is an important part of early-stage career development. Opportunities will be provided to connect suitable candidates to experts in the professional fundamental physics network both domestic and international. This can be crucial for students from institutions with diverse backgrounds where career opportunities may be hindered not by capability, but by a lack of professional connections.

Websites:

Name: John Lekki

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NASA Center: Glenn Research Center

Institutions: Any

SMD Division: Earth Science

Keywords: Hyperspectral, Remote Sensing, Water Quality

Research: My research is associated with utilizing hyperspectral remote sensing for improved determination of water quality in freshwater systems. It encompasses advancing remote sensing instrumentation as well as developing algorithms that improve differentiation of water constituents, i.e. potentially harmful algal bloom from other algal blooms.

Mentoring: My mentoring approach is to understand where students are in their academic or research development and tailor their research goals so that the research is of the appropriate complexity for the student but also engaging and will allow them to grow in their field of study.

Websites:

Name: John Moisan

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NASA Center: Wallops Flight Facility

Institutions: University of Maryland, Eastern Shore

SMD Division: Earth Science

Keywords: Artificial Intelligence, Remote Sensing, Curiosity-Driven Exploration, Earth Science

Research: I am modifying a remote sensing instrument that uses hyperspectral imaging (push broom) spectrometers, thermal and visible cameras and an optical pointing instrument that can change the 'look angle' of a higher spectral resolution spectrometer. I am working to insert an AI application that will operate the optical pointing system to enable active curiosity-driven exploration. The goal is to develop an instrument system that can operate on its own to map out unknown areas with scientific interest, such as a remote ocean algal bloom, but with as little human interaction or guidance as possible.

Mentoring: I am a very approachable person and work well with students. Prior to working for NASA I was a professor and enjoyed working with students. I thought a class on oceanographic field methods, which put me at sea with my students doing hands on work. At NASA I have has many student interns who have helped in my work. In one specific summer of 2004 I had the fortunate experience working with six summer interns to develop a Genetic Programming package to evolve the right-hand-side of system of coupled differential equations. The group worked together with me to develop and test the code which was eventually repackaged into a software package that is still in use today. I find it enjoyable to work with students towards a goal and enjoy letting them bring into the project their own ideas or solutions.

Websites: https://science.gsfc.nasa.gov/sci/bio/john.r.moisan.

Name: Jordan Bell

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NASA Center: Marshall Space Flight Center

Institutions: Any and all

SMD Division: Earth Science

Keywords: Agriculture, Remote Sensing, Severe Weather

Research: Severe weather, especially damaging winds and hail, impact agricultural areas throughout the Midwest and Great Plains annually during the growing season. Our research focuses on using available Earth Observations to identify and map these areas of impact and analyze the impacts to the agricultural crops. Our research uses both Earth Observations freely available from NASA and other space agencies, such as the European Space Agency, but also leverages NASA's Commercial Smallsat Data Acquisition (CDSA) Program. While our research focuses on mainly severe winds and hail damage to agricultural crops, our research team also is studying impacts using remote sensing from tornadoes, flooding, and other various natural hazards.

Research projects that would be considered beneficial to our team include:

- Continuing to populate our Hail and Wind Damage Swath (HWDS) database with events from the past several years
- Using the HWDS and Earth Observations to study the impacts to agricultural crops from previous years to better understand the varying degrees of damage caused by HWDS
- Using the HWDS Database to identify broader atmospheric conditions that may support severe thunderstorms that can cause HWDS
- Using remote sensing datasets and ML/AI to identify severe weather and/or natural hazards impacts

Mentoring: Our team fosters a very inclusive learning environment for those collaborate and work with us. Our team is a mix of mid- and early career professionals, that focuses on using everyone's strengths to create a balanced approach to problem solving and advancing the science. When working with new colleagues or students, we first get to know the individual, understand what their strengths and intangibles are, and identifying what they are trying to get out of working with us. We then formulate an approach that is beneficial to all parties while also achieving the goals of the project.

Websites:

Name: Kagen Crawford

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NASA Center: Marshall Space Flight Center

Institutions: HBCU, Hispanic Serving Institutions, 4-year colleges, community colleges, any or all

SMD Division: Heliophysics,Biological & Physical Sciences

Keywords: Hydrogen Separation, Hydrogen Purification, Hydrogen Capture, Recovering Hydrogen from Methane

Research: Low-energy hydrogen separation is beneficial to a few SMD divisions through the disciplines of material science, fluid physics, low-cost access to space through sustainability, and combustion sciences. Hydrogen separation technologies, such as sorbents, fuel cells, and membranes, currently exist in the consumer market within industries, but these technologies are operated at large-scales capable of handling high temperatures or pressures required for bulk separation. These existing processes are energy intensive and presumably too hazardous for an aerospace application such as an off-Earth hydrogen fueling station or hydrogen separator for closed-loop life support systems in habitats. Hydrogen is the cleanest fuel feedstock available to humankind and it exists as 75% of the atoms in the universe. Low-energy hydrogen separation is a milestone that must be achieved to further the future of space exploration, extraterrestrial colonization, and sustainable life support systems. Aside from NASA applications, developing this technology would serve as a major environmental milestone for more energy efficient clean energy and greenhouse gas (methane) processing.

Undergraduate students and research faculty could perform evaluation of multiple hydrogen separation candidates (membranes, adsorbents, or metal organic frameworks) at NASA-required pressures and temperatures to assist in down-selection of a low-energy hydrogen separation media. There are multiple consumer-off-the-shelf (COTS) items that could be tested as well as potential for novel developments at the university. Some testing could be generic and recyclable indicating low-cost to the research institution such as rotating multiple adsorbents in the same adsorption column. Other testing may require fabrication of hardware, such as a fuel cell or separator, to test.

Mentoring: I am currently a Principal Investigator for PPA Development in ECLSS and have been given the privilege to supervise NASA Pathways Interns and PIP Rotations within the ES62 Branch. My leadership style is a balance of visionary and coaching which I am still developing, applying, and refining.

As a mentor, I hold weekly meetings to familiarize myself with my mentee on a personal and professional level and establish an allotted time for questions, discussion, coaching, and conversation while allowing them time and freedom to work independently throughout the week. My goal as a mentor is to instill growth and development in the students I work with while also encouraging them to apply their ideas, creativity, and perspectives to help solve a problem or complete a task. Peak success in mentorship for me is when a mentee feels welcome, respected, engaged, and empowered to speak, think, and inquire openly to discuss their thoughts and feelings regarding a project or task. I do not believe that a mentor has to serve as an intellectual superior to their mentee, but that the mentor should be mentally, emotionally, and physically available to help bring out the best potential in their mentee.

Websites:

Name: KEITH CHIN

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NASA Center: Jet Propulsion Laboratory

Institutions: University of Houston - Hispanic Serving Institution

SMD Division: Planetary Science

Keywords: Quantum Sensors, Life Detection, Electrochemistry, SPR

Research: Discovery of ancient or extant life in other planets such as Mars and Europa will require in situ investigations using technologies that can detect and characterize active and dormant organic-based systems on a microscopic scale [1] from bulk sample characterization. In this project, we will develop and employ ElectrocheMical coupled fiber-based Plasmonic Real-time Imaging and Spectrometry (EMPRIS) to investigate both equilibrium and dynamic chemical systems containing organics. EMPRIS synergetically incorporates electrochemical, plasmonic enhanced spectroscopy, and surface plasmon microscopy to detect all forms of modal actions down to a nanometer (nm) spatial scale. 1) The application of an electrochemical (EC) potential will induce surface polarization, and therefore, the electromagnetic and chemical enhancement to the plasmonic imaging and spectrometry measurement. 2) Plasmonic sensing and spectrometry will provide binding kinetics of organics and is extremely sensitive to enable label-free identification of organics. 3) The addition of spatial and vibrational microscopy imaging and mapping provides direct observable confirmation of real-time transport dynamics and surface interactions. In particular for the application of pre-biotic materials detection such as organics, EMPRIS employs an innovative method of combining electrochemical and spectrometry technique onto plasmonic surface measurements providing extra response dimensions for characterization and detectability purposes based on the fundamental chemical property of detection is charge density which enables surface chemistry such as redox or adsorption onto plasmonic surfaces. Enhanced imaging coupled with electrochemical and spectrometry from EMPRIS can provide tremendous molecular details on grain-boundary interfaces in samples such as soils along with chemical speciation onto plasmonic surfaces. EMPRIS, therefore, represents the most advanced next-generation of quantum sensoring technologies for life-detection applications for space exploration by NASA.

Mentoring: The proposed program aims to educate, train and provide hand-on experience to graduate and undergraduate students from minority serving universities (University of Houston (UH)) on electrochemistry, sensing, imaging and spectrometry technique developments. This program will be built on our collaborations between the University of Houston and JPL to develop an in situ ElectrocheMical coupled fiber-based Plasmonic enhanced Imaging and Spectrometry (EMPRIS) to investigate both equilibrium and dynamic chemical systems containing organics. The program will be a four years program and we will: (1) Mentor and support graduate and undergraduate capstone students on projects related to electrochemistry, sensing, imaging, and detection methods development. 3 capstone projects (4 students per project) per year will be supported, (2) Organize a 6-weeks summer experience program on

integrated methods of electrochemistry, optical imaging and spectrometry to detect and characterize the biological and chemical processes. The student will stay in University of Houston for 3 weeks and JPL for 3 weeks. 10 students per year will be joining the program. (3) Mentor graduate research students for EMPRIS development.
Team strength and synergy: 1) UH is designated as a Hispanic serving institution by the Department of Education and ranks among the top 10 universities nationally for Campus Ethnic Diversity, with a diversity score of 0.73 out of 1.0 (see URL: https://www.usnews.com/best-colleges/rankings/national-universities/campus-ethnic-diversity). 2) Our project includes many different research aspects, such as electrochemical detection, optical sensing, biological imaging, and optical spectrometry. This will allow us to train the next generations of the workforce and researchers that require multidimensional knowledge and skills. 3) The lab at UH has the capabilities to perform electrochemical characterization, optical imaging, and spectrometry measurements (Raman) at the same time. 4) UH is located in Houston which is the energy center of the world. Almost all the energy companies have headquarters or major branches in Houston, and many of them are looking for the next generation of researchers and workforce. 5) The research team has established strong collaborations in the last two years.

Websites: https://www.ee.uh.edu/faculty/shan

Name: Kyongsik Yun

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NASA Center: Jet Propulsion Laboratory

Institutions: All

SMD Division: Earth Science

Keywords: data science, machine learning, InSAR, groundwater, subsidence

Research: 1. Groundwater Availability Estimation:
This project aims to map and estimate groundwater availability using various geophysical and data-driven techniques. It involves analyzing historical and current groundwater data and developing predictive models for future availability, considering factors like climate change and land use.

2. InSAR Remote Sensing Data Analysis for Land Deformation:
This project involves the utilization of InSAR data to monitor land deformation, such as subsidence and uplift. It investigates the causes of deformation and develops tools to predict and mitigate associated hazards.

3. Satellite Multispectral Image Segmentation and Tracking for Wildfire Management:
This project focuses on developing algorithms to segment and track wildfires using multispectral satellite imagery. It integrates real-time data to enhance wildfire monitoring and uses machine learning for more effective risk assessment and management.

Mentoring: 1. Inclusive and Respectful Environment:

- Our research team comprises undergraduates, graduate students, and mentors who are all equal contributors, fostering an atmosphere of mutual respect and appreciation.
- We are committed to diversity, equity, and inclusion, ensuring that everyone's voices and perspectives are valued and acknowledged, creating a space where all students feel respected, included, and empowered.

2. Cultivating Scientific Independence:

- Students are encouraged to develop their scientific approaches and research questions, empowering them to progress towards independent research careers.
- Mentorship focuses on guiding and supporting students in refining their ideas, perspectives, and research goals, providing a strong foundation for their future independent research pursuits.

3. Empowering Ownership and Control:

- Students are given the opportunity to take full ownership of their projects, from inception to publication, with mentor guidance and support.
- They are entrusted with a significant degree of control over their work, enabling them to make decisions and contributions aligned with their unique research interests and career aspirations.

4. Clear Communication and Collaborative Expectations:

- Expectations, objectives, and project goals are communicated clearly and revisited as the project unfolds.
- Collaboratively, the mentor and students set monthly, quarterly, and yearly milestones, ensuring alignment and mutual accountability.

5. Support, Networking, and Feedback:

- We actively facilitate opportunities for students to collaborate with a diverse range of scientists and engineers within the research team, institution, and beyond.
- Students are encouraged to expand their research network, engage in diverse projects, attend conferences, and connect with various research communities.
- Regular stand-up meetings ensure ongoing communication, allowing for updates, progress discussions, and addressing any challenges or questions.
- Constructive feedback is provided to enhance students' research and communication skills, supporting their continuous growth and excellence in academia and beyond.

Websites: https://www.kyongsikyun.com/

Name: Lin Yi

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NASA Center: Jet Propulsion Laboratory

Institutions: All

SMD Division: Astrophysics,Earth Science,Planetary Science

Keywords: Rf and Optical communications, sensing, positioning, navigation and timing

Research: The group's R&D focus is RF and optical technologies in communications, navigation, timing and radio/optical science applications, specifically, here are a few technical areas that the group is looking for participation:
Modulating retroreflecting optical communications application in planetary missions
Ion beam technology for space missions
Magnetic field sensing
X/Ka band solid-state high power amplifiers
X/Ka band cryogenic low noise amplifiers
DSN radio astronomy instrumentation
Laser guiding stars and applications in DSN
DSN antenna noise mitigation
Data science applications in DSN

Mentoring: Dr. Lin Yi's group has been accommodating student interns nationwide and internationally. Dr. Yi typically tailored the internship project together with the student (as well as the faculty advisor) to match the passion and interest of the student. The student will receive the mentorship to write a formal/or informal research proposal before the internship starts so that the student can have the time to prepare the skills and knowledge before the internship starts. This has been proven to be an effective way to guarantee the student's performance. During the internship, Dr. Yi typically meets with the student and faculty advisory on a regular basis and provides guidance and pivotal suggestions to maximize the student's final achievements. Dr. Yi's group members have been providing engineering and research support for interns for many years and this group has the reputation of being inclusive and diverse. Dr. Yi is also an experienced research proposal writer and will be willing to work with the faculty and students to pursue further funding from NASA as well as other funding agencies.

Websites: https://www.linkedin.com/in/lin-yi-6516a677

Name: MANOHAR DESHPANDE

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NASA Center: Goddard Space Flight Center

Institutions: Hispanic Serving Institutions, HBCU, Community Colleges

SMD Division: Astrophysics,Earth Science,Planetary Science

Keywords: Planetary Microwave Remote Sensing

Research: Astrophysics: It has been shown that the galactic space contains gas clouds, dust grains, and more — existing in ionic, atomic, or molecular phases. These gas clouds highly charged dust continuously become sources of electromagnetic radiation. We deploy radiometers either in the space or on the ground to receive these galactic electromagnetic radiations and analyze the received radiation to detect presence of basic constituents (elements) in these galactic clouds, dust etc. The signal received by a radiometer is wide band. However, each constituent has a electromagnetic signatures which are at well defined frequencies with very narrow band. One of the important responsibilities of microwave engineers is to separate the wide band galactic signal into desire frequencies with vary narrow bandwidth. My research area is to design the filters (known as dichroic filters) to separate inter stellular microwave signal into individual frequency bands.

Earth Science: CubeSats are often used for microwave earth remote sensing and upper atmospheric investigation. We are interested in designing a radar/radiometer that is compatible with the CubeSats SWaP requirement, My research area is in the design of RF front end including RF antennas for CubeSats that is compatible with their SWaP requirements

Planetary Science: Low frequency radars embedded into the belly of a rover or any moving platform is used for detecting in-situ resources hidden below the planetary surfaces. For optimum design of the radar for desire penetration depth, it is essential for the radar designers to know complex electric properties of planetary medium. My research area is using the planetary rock or regolith samples available on the Earth to measure their complex permittivity and permeability using microwave measurement in the lab. This will create a data base that would be used by the radar designers in their radar link budgets.
The regolith or analog simulant are placed in a waveguide of appropriate size and its microwave reflectivity and transmittivity are measured. And from the measured data, using retrieval algorithms, the complex electrical properties are extracted. My research area also include application of AI/ML in development of the retrieval algorithms.

Mentoring: I have been mentoring NASA MUREP research fellows from the Florida International University. I have also mentored NASA's EPSCoR projects. To increase creativity and curiosity in the students, my approach is always concentrated on clearly defining the problem to the student and invite them to provide solutions. To examine their idea in depth and point out the deficiency in their ideas and challenge them to come up with good solutions

For last four years, I am interacting with students remotely in a flexible manners. For a short visit to NASA GSFC site, visiting the labs.

Websites: I do not have any personal wesite

Name: Martial Sawasawa

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NASA Center: Wallops Flight Facility

Institutions: any or all

SMD Division: Astrophysics,Heliophysics,Earth Science,Planetary Science

Keywords: Electromagnetic Interference (EMI), RF, Ferrite, Wireless, High-Speed PCB

Research: Our goal is to support and provide scientists with the means to conduct research to understand the sun, earth, solar system, and the universe. The design and creation of the NASA Wallops Arc-Second Pointer (WASP) is a result of such endeavor and support.

For this reason, we have established strong relationships with universities and the international scientific community via project such as XL-Calibur (a balloon borne X-ray telescope that measures the X-rays from black holes and neutron stars in our galaxy), Coronal Diagnostic Experiment (CODEX), CORonal Spectropolarimeter for Airborne Infrared Research (CORSAIR), and many other projects.

As technology improves, scientific demands increases. We are currently receiving requests for high-speed communication PCB (1GHz +) increase and we are anticipating more (3-10GHz) in the future.
To properly support our scientific community in general, and Science Mission Directorate (SMD) in particular, our research and goal involves (and will involve) finding novel or innovative ways of:

- designing avionics with improved cost, weight, or electrical profile
- designing high-speed circuits (PCB – Printed Circuit Board) for communication/telemetry or
- minimizing, mitigating or eliminating Electromagnetic Interference (EMI)

So, bring your curiosity, your sense of initiative, and your team-work attitude so we can make something great, fun, and cool for NASA, science, and the world!

Mentoring: 1) TRAINING:
At NASA we're fortunate to have access to training that help employees in every way.
Before we start with research, I would ensure that the students have been enrolled in or taken:
- a bias training: This will help students be aware of potential biases regarding race, gender, age, or background (academic, economic, etc.) so that they do not fall prey to their own prejudices.
- a work-life balance (or mental health) training: Even well-established professionals face burnout. For students, unfortunately, it is easier to experience burnout as a result of excessive ambition, extreme sense of impostor syndrome, pressure to contribute, or lack of clear direction amongst other reason.

To circumvent this, I will create a plan with the student. Then, we will divide that plan into small and manageable chunks. We will meet weekly for progress' status, and daily for checking for potential concern, questions, or plan review.
Also, it is crucial for the student to be challenged. As a result, the research plan will be structured in a way that is not too easy to bore the student and not extreme to crush their spirit but challenging enough to keep them curious and excited to learn.
So, we will start by knowing the student's skill level and build from there.

2) COMMUNICATION
- It is important to create proper channels and type of communication that suit the student's personality and needs. Some students have no problem raising concerns in meetings while others can only do so on a one-on-one meeting. I will always have that discussion with them and will leave a daily time to talk with them for any reason they might have.
- Every concern will be heard, and every idea will be considered. I will create with students a "box of potential exploration" wherein ideas that do not match our research goals will be residing for potential future use.
This allows everyone's voice to be heard.
- Weekly or monthly, students will be asked to provide ideas of what they think should be improved.

3) NETWORKING and STUDENTS' MORALE
- After knowing what they expect to gain from this experience, as mentor, I will make it my duty to find groups that match their interest or career trajectory because I truly want them to succeed not only through research but also via personal and career development.
- To boost morale, engagement, and to promote cohesion, team activities such as bowling, team lunch, or other activities of their choice will be done on a reasonable and discussed timeline.

Websites: 1) WFF: https://www.nasa.gov/wallops/ 2) XL-Calibur: https://sites.wustl.edu/xlcal/home/ 3) CODEX: https://techport.nasa.gov/view/95780 4) WaSP: https://ntrs.nasa.gov/api/citations/20180002870/downloads/20180002870.pdf

Name: MELINDA KAHRE

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NASA Center: Ames Research Center

Institutions: Any or all

SMD Division: Planetary Science

Keywords: Mars atmosphere and climate, Numerical modeling and visualization, Planetary atmospheres

Research: OVERVIEW: In the Mars Climate Modeling Center, we use numerical models to study the present and past Mars atmosphere and climate, and Mars as an analog for exoplanets. We develop Mars global climate models (GCMs), analysis software, model output visualization techniques, and compare simulated output to available observational data. We make our tools publicly available with documentation, and we actively seek opportunities to engage with students and researchers of all levels to teach users how to use our products. Our diverse research goals provide many opportunities to involve students, and we have extensive experience tailoring projects based on student interest and skills.

CURRENT MARS: Possible research topics related to the current atmosphere and climate of Mars include investigating the dust, water, and CO2 cycles, or investigating how energy, momentum, aerosols, and trace gasses travel between the lower and upper atmosphere. These processes are known to be critical for the climate system, but they are complicated and not well understood.

EARLY MARS: Geologic evidence shows that liquid water flowed on Mars' surface ~3.5-4 billion years ago, but it is not clear what made the early climate so much warmer and wetter than it is today. Possible early Mars research topics include investigating potential sources of greenhouse warming, the ancient hydrological cycle, and the effects of clouds on the early climate.

ARID MARS-LIKE EXOPLANETS: Arid land planets like Mars may be common in planetary systems outside of our solar system. It is important to understand their climate, potential habitability, and defining characteristics to aid in their detection and characterization. Projects can be designed for investigating the coupling between the dust and water cycles (when water is limited) and habitability of planets over a range of stellar types, atmospheric masses, planetary sizes, etc.

OUTPUT ANALYSIS AND VISUALIZATION: Analyzing and visualizing complex multi-dimensional GCM output is challenging, and we create tools to streamline the process for users. Projects targeting analysis, visualization, and science communication can be designed to help us better understand and share our modeling results through graphics development.

RELEVANCE: These research topics are consistent with NASA's strategic objective in planetary science to ascertain the content, origin, and evolution of the solar system.

Mentoring: The Mars Climate Modeling Center (MCMC) conceptualizes the mentor-mentee relationship as a mutually beneficial partnership enriched by the multiplicity of backgrounds, education, and experiences of both parties. We believe that the mentor's primary role is to assist the mentee in achieving their goals, which involves advocating for their success and creating a supportive environment that fosters personal and professional growth. The mentee's primary responsibilities are to identify and communicate their goals, needs, and deadlines to their mentor and to demonstrate initiative by progressing towards their goals and seeking guidance from their mentor as needed.

We aim to provide an inclusive mentoring environment that empowers all individuals to thrive, regardless of gender, gender identity, race or ethnicity, national origin, religion, (dis)ability, sexual orientation, etc. We work collaboratively with our mentees to organize remote and in-person activities, facilitate participation in meetings and conferences, and provide accommodations as necessary. We are committed to regularly scheduled conversations and making ourselves available for additional meetings, feedback, and assistance as needed.

Websites: https://www.nasa.gov/space-science-and-astrobiology-at-ames/division-overview/planetary-systems-branch-overview-stt/mars-climate-modeling-center/

Name: Michael Campola

Email: michael.j.campola_at_nasa.gov

NASA Center: Goddard Space Flight Center

Institutions: SmallSat/CubeSat projects, space environment testbeds, commercially available semiconductors in space

SMD Division: Heliophysics

Keywords: Radiation Effects, Technology, Space Weather

Research: Our group has research thrusts in Model-Based Mission Assurance, emerging radiation hardness assurance methodologies, environment modeling, radiation effects in field programmable gate arrays - wide bandgap power devices - scaled CMOS - imaging sensors - etc.

Mentoring: We partner with a range of institutions and international colleagues to bring a diversity of thought to new approaches in test methodologies, documentation, and risk postures to provide the best service to our missions.

Websites: https://radhome.gsfc.nasa.gov/ and https://nepp.nasa.gov/

Name: Michael Cooney

Email: michael.p.cooney_at_nasa.gov

NASA Center: Langley Research Center

Institutions: Any institution

SMD Division: Astrophysics,Earth Science,Biological & Physical Sciences

Keywords: Detectors, CubeSats, Earth, Physics

Research: I'm primarily interested in low Technology Readiness Level (TRL) projects, focusing on developing enabling technologies for science focused applications. I want my technologies to not just have a nice paper at the end, but an actual science deliverable to aid humanity in an incremental way.
My graduate work was focused on particle physics and designing, building, and testing cutting edge photodetectors, of which I designed and fabricated dozens of different designs along with the requisite readout circuitry (Analog-to-Digital Converters, Digital-to-Analog Converters, timing circuits, control circuits). I was the principal engineer on dozens of Application Specific Integrated Circuits (ASICs).

My work at NASA has allowed me to continue partnerships and work with graphene-based photodetectors, specifically focused on high-speed, broadband photodetection. The graphene photodetectors used various doping and design techniques to enable broadband photodetection significantly faster than the traditional thermal detector designs.
I'm also quite interested in proving and validating in-space technologies. ARCSTONE is a 6U CubeSat instrument I have helped design and am currently assembling flight hardware by leveraging significant amounts of Commercial Off the Shelf (COTS) hardware with expertise from government (USGS, NIST, NASA), academia (UC-Boulder), and private industry (Resonon, Blue Canyon Technologies). CubeSats are an enabling technology allowing for relatively low cost and fast development cycles and I'm excited to continue work in this space. My ultimate interest would be to leverage my experience in the development sensors and knowledge of CubeSats to validate novel sensor technologies on-orbit. We at LaRC have contacts in the CubeSat community along with expertise in engineering and test facilities (electrical, thermal, and environmental).

Mentoring: I currently serve on a PhD committee of one PhD candidate at Virginia Tech with an adjunct facility appointment. I have served on the PhD committee of two additional, since graduated, students. I have served on the Masters' committees of two students as well. At NASA, I have hosted 7 undergraduate and graduate interns, all funded via my detector project funds, both onsite and remote students. Of the students I have mentored, 80% are women and/or minority students. I have worked with local high schools to promote STEM outreach by giving lectures, mentoring individual students, tours of NASA, and similar outreach activities. Having grown up in Guam and Hawai'i, I have a strong interest in promoting education to underrepresented and underserved communities while making every student feel they can meaningfully contribute to their local community and the broader science community.

Websites:

Name: Michael Corcoran

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NASA Center: Goddard Space Flight Center

Institutions: HBCU, community college

SMD Division: Astrophysics

Keywords: X-rays, stars, binary stars

Research: I study X-ray emission from massive stars and binary systems, where the X-ray emission is produced by the collisions of stellar winds.

Mentoring: I believe effective mentoring requires a hands on approach to analysis for the mentees, and in fostering an inclusive environment.

Websites: https://science.gsfc.nasa.gov/sed/bio/michael.f.corcoran

Name: Mohan Shankar

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NASA Center: Langley Research Center

Institutions: Any or all

SMD Division: Earth Science

Keywords: Instrument calibration, Design, post launch validation, Earth radiation budget,

Research: My research is focused on developing and implementing post-launch calibration and validation protocols for broadband instruments in support of NASA's Earth Science Division. I am also interested in pursuing innovative concepts for achieving significant reductions in the size, weight, power and cost of instruments with the eventual goal of flying them on smallsats or cubesats. I am currently collaborating with a university Professor to develop concepts for the next generation of imagers and radiometers for Earth remote sensing. There are several research project opportunities within the scope of the work I do appropriate for undergraduate projects, These could range from analysis of datasets produced by instruments currently observing Earth to specific studies to inform the development of the novel instrument concepts to study the Earth or other planets.

Mentoring: I have had many years of experience working with students at various education levels- undergraduate to graduate during my career. My approach to mentoring depends on the personality type of student I work with. First, I would want the mentee to feel welcomed, introduce them to the team, and others who they will interact with. I will ensure that all resources are made available to conduct the research- provide all necessary background material, be available to meet and discuss issues/concerns. My mentoring approach employs coaching students to encourage them to develop solutions to the problems themselves, and provide guidance along the way. I maintain and encourage having a growth mindset where learning goes both ways between the mentor and the mentee. I believe in creating an environment conducive to open thoughts and ideas even if some of those may conflict with my own.

Websites: https://ceres.larc.nasa.gov

Name: Orenthal Tucker

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NASA Center: Goddard Space Flight Center

Institutions: HBCU

SMD Division: Planetary Science

Keywords: Exospheres, Atmospheric Escape, Molecular Dynamics, Rarefied Gas Dynamics

Research: My research area focuses on the development and use of numerical techniques such as the Direct Monte Carlo Simulation method to model planetary exospheres and atmospheric escape. Potential projects: atmospheric sputtering of Titan upper atmosphere, modeling the lunar exosphere (current and past), parametric studies of atmospheric escape for general application to solar/exoplanet exospheres, modeling the exospheres of icy solar system moons and more. In addition, I am interested in using Molecular Dynamics to understand plasma surface interactions and the atomic level leading to chemistry and ejection of molecules which source tenuous solar system atmospheres.

Mentoring: My mentoring approach is very hands on. That is, depending on experience level and familiarity I will work directly with collaborators on coding and how to submit jobs to super computers. I am very responsive to emails and calls. Typically, I meet weekly with collaborators to discuss projects. Each collaboration is unique, so I strive to be adaptable. Making sure participants feel welcome, respected and engaged is the highest priority.

Websites:

Name: PAMELA MARCUM

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NASA Center: Ames Research Center

Institutions: all

SMD Division: Astrophysics

Keywords: galaxy evolution, data analysis techniques, multi-wavelength observations, stellar populations

Research: My primary research explores various aspects of galaxy evolution. Recent activities of our research group include formulating new data reduction techniques to search for previously-undetected faint, diffuse hot gas (X-ray) halos around galaxies and developing novel tools for enhancing low surface brightness emission at optical (HST) and infrared (Roman) wavelengths, The low surface brightness features unveiled by these analyses provide insights into galaxy evolution processes, Our diverse range of studies also includes the utilization of NASA/IRTF spectra and NASA/TESS light curves to expose the nature of the enigmatic "peculiar Ap-type" stars that have unusually high magnetic fields and odd chemistries. The above projects hold significant potential for expansion into future research projects suitable for both undergraduate students and their faculty research advisors.

Possible research projects related to ongoing work in our research group range from technical to purely scientific. Some possible technical projects include (but are not limited to): refining the spectrum-fitting software that we are currently using for deriving physical stellar parameters for paradigm-breaking stars; and adding modules to our low surface brightness detection software to account for systematic errors at finer levels of granularity than are currently being considered. Examples of potential science projects include follow-up studies of previously-uncataloged X-ray structures around galaxies that are revealed through our custom data pipelines, studies of optical and infrared low surface brightness features unveiled by our current HST image analysis (and planned future Roman data), and merging Galactic with stellar astronomy by correlating Ap star properties with environment. These are just a few specific examples; other topics related to galaxy evolution and peculiar stars would likewise be appropriate for collaboration.

Mentoring: I was a University professor for 13 years before employment with NASA, mentoring students at high school through graduate school levels. More recently, I have mentored NASA Postdoctoral Program fellows and early career scientists both formally and informally, These experiences eventually taught me that mentoring is most effective when mutual respect exists, and the mentor views the student as an equal who is deserving of all the mentor's "lessons learned", ideas and advice that the student can leverage to achieve a higher trajectory and smoother career path than the mentor had. Sometimes effective mentoring is providing tips on how to write a compelling grant proposal, or introducing the student to a larger network of potential future collaborators. Other times, the very best form of mentoring might involve simply sitting over a cup of coffee, providing tissues and reassuring / consoling /

counseling the student when they just had the worst day ever. True mentoring involves whole-heartedly supporting the student, insuring they are given visibility and credit for their work, and providing a work environment that promotes self-confidence, enhances mental health, provides a safe place to be themselves, and is conducive to meeting research goals, and celebrates accomplishments.

Finally, some personal context: while I'm not a member of a recognized underserved community, I grew up in a low-income family within a small impoverished Appalachian town, and I was a first-generation high school and college graduate. I feel a special connection to others who share similar struggles unique to a low socioeconomic upbringing: the lack of a strong academic foundation, not knowing how the "academic system" works, and the uncertainty of knowing how to get from "here" to "there" along the academic career path.

Websites:

Name: Peter Brereton

Email: peter.g.brereton_at_nasa.gov

NASA Center: Goddard Space Flight Center

Institutions: All, in particular small 4-year primarily undergraduate institutions such as Bates College, Union College, the US Naval Academy, West Point, etc. Also, the HBCU/MSI community in the DC, MD, VA area is very rich in relevant expertise

SMD Division: Earth Science

Keywords: quantum sensing, cold atoms, atomic clocks

Research: Quantum sensors based on laser-cooled atoms are at the core of an emerging class of ultra-sensitive inertial and gravitational sensors. These sensors have promising applications across the spectrum of aerospace and remote sensing technologies, including precision navigation and timing in GPS denied environments, ultra-precise time keeping and metrology, quantum memories and gravity mapping. A key technological challenge in developing robust, space-qualified cold atom systems is the physics architecture and systems maturation of a high-brightness source of ultracold atoms. Advancing the technology maturity level of an ultra-cold Cs or Rb source will accelerate NASA’s quantum-enabled future missions to map Earth's gravity, understand the interior of planetary objects, detect space debris and search for dark matter or dark energy. This technology cuts across multiple science areas central to NASA's mission including Earth Science, Planetary Science, Fundamental Physics and Astrophysics.

All cold-atom based sensing technologies require extremely high densities (more than 100 million) of atoms in dilute clouds at ultracold temperatures (&lt,10 nK). The laser cooling techniques required to reach these densities and temperatures have been demonstrated in academic research laboratories. However, in order to advance these research results into applied technologies, these experimental techniques must be analyzed in a systems engineering approach. This multi-year, proposal aims to build a Cs or Rb cold-atom test bed utilizing COTS systems, demonstrate Raman-side band and other advanced laser cooling to &lt,300 nK, and develop rapid analysis tools to enable efficient measurement of atom cloud temperature and density.

This proposal, part of the broader Quantum Engineering and Sensing Technology (QuEST) Laboratory intiative at Goddard would enable the coupling atomic physics techniques to the existing optical, laser and systems engineering core capabilities at NASA Goddard Space Flight Center. Faculty with experience in experimental and theoretical atomic physics would be central to designing the experiments, instrumentation and architecture of the required bench-scale physics. Students would learn critical skills in designing cutting edge experiments with lasers, vacuum systems and high precision test equipment.

Mentoring: This program is unique within NASA in that we need the expertise of the academic experimental and theoretical physics community to bring their knowledge and expertise into the

NASA community. Our mentoring approach is to approach the QuEST team as a holistic community, without distinction between NASA roles and external expertise. Each faculty member will be given wide latitude to direct laboratory experiments and assigned a QuEST lead physicisist to coordinate with Goddard engineers and facilities. Students will be assigned a NASA and faculty mentor, given the required training to be productive and safe in the laboratory. Opportunities for engagement with the broader quantum engineering community will be provided through NASA Goddard's membership in the Mid-Atlantic Quantum Alliance, a consortium of over 20 academic, government and industry leaders in quantum information science and technology in the area.

Websites:

Name: Rei Ueyama

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NASA Center: Ames Research Center

Institutions: All

SMD Division: Earth Science

Keywords: atmospheric science, meteorology, airborne science, atmospheric composition, stratosphere

Research: One of the primary objectives of our research is to improve understanding of how future changes in the composition of the upper troposphere and stratosphere will impact climate. To this end, we study dynamical, chemical, transport, and cloud microphysical processes that affect aerosols, clouds, and trace gases in this region of Earth's atmosphere using a combination of observational data analysis and modeling tools. One such project utilizes satellite-derived convection dataset to investigate the global impact of deep convection on atmospheric composition and dynamics.

Our research often involves the analysis of in situ measurements obtained from NASA airborne campaigns. Our team has unique insights on airborne datasets due to a long history of providing science leadership as well as meteorological forecasting and flight planning support for NASA airborne missions dating back to the 1980s. Some of our recent participation include support for DCOTSS (Dynamics and Chemistry of the Summer Stratosphere), ACCLIP (Asian Summer Monsoon Chemical and Climate Impact Project), ORACLES (Observations of Aerosols above Clouds and their Interactions), POSIDON (Pacific Oxidants, Sulfur, Ice, Dehydration, and Convection) and ATTREX (Airborne Tropical Tropopause Experiment) campaigns. We are always developing ideas for research projects that utilize airborne data to improve process-level understanding of the atmosphere.

Our research goals are directly aligned with the objectives of NASA Earth Science Division's Atmospheric Composition Focus Area, addressing questions such as "How is atmospheric composition changing?" and "How does atmospheric composition respond to and affect global environmental change?". Our airborne mission support capabilities and interests extend beyond the ESD Atmospheric Composition program and include other programs such as Weather and Atmospheric Dynamics, and Climate Variability and Change, as well as the Ocean Biology and Biogeochemistry Program in the NASA HQ Science Mission Directorate.

Mentoring: I am a mid-career scientist with a great interest in building long-lasting relationships with students and academic professionals particularly in minority-serving institutions. I am a woman of color and owe a large part of my success in the science field to wonderful mentors I have had over the years. My participation in the University Corporation for Atmospheric Research (UCAR) Significant Opportunities in Atmospheric Research and science (SOARS) program (https://soars.ucar.edu/), an undergraduate-to-graduate bridge program designed to broaden participation of historically underrepresented communities in the atmospheric and related sciences, was a pivotal point in my career where I learned of the excitement of atmospheric science research as well as the importance of mentorship (SOARS mentees are matched with three mentors during their first year of the program and become a mentor to first-year students in successive years). I have tried to embody the principles of a successful mentorship in all of my formal and informal engagements with students and early career scientists on various research projects and field deployments. I interact with them as equals in an inclusive environment where their voices are heard and valued. I also often advocate for them in situations where they may be left vulnerable. I believe this is especially important in the field (e.g., during airborne field campaigns) where their usual support network may not be readily available.

Aside from mentoring activities as a NASA scientist, I have also led these efforts within the broader science community as Chair of the American Meteorological Society (AMS) Committee on Middle Atmosphere (https://www.ametsoc.org/index.cfm/stac/committees/committee-on-middle-atmosphere/). During my tenure, we have developed resources for students in middle atmosphere science and are also working on a commitment statement describing our committee's commitment to uphold AMS's values in support of creating an inclusive, equitable, and welcoming culture that fosters creativity, innovation, and collaboration. Partly in recognition of this leadership role, I was recently nominated and selected to be a member of the AMS Equity Assessment Task Force which supports AMS initiative on the Equity Assessment process. I have so far participated in several Focus Group discussions to determine key themes that would constitute the culture survey to gather members' experiences with AMS.

Websites: https://www.nasa.gov/people/rei-ueyama/

Name: RICHARD BURNS

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NASA Center: Goddard Space Flight Center

Institutions: all

SMD Division: Heliophysics, Astrophysics, Planetary

Keywords: navigation, mission operations, artificial intelligence, ground systems, autonomy, cloud computing

Research: Relevant to all SMD Divisions as this research pertains to engineering aspects of spacecraft operations.
Example projects:
1) Application of autonomous spacecraft systems to relevant operational challenges such as surface landing / sample collection, navigation, and other challenges of spacecraft performance monitoring and fault correction.
2) Cloud computing and application to real-time spacecraft operation and analysis.

Mentoring: Students will be mentored in a diverse environment of subject matter experts within the organization and included in relevant project discussions in order to foster exposure to the operations environment and trigger follow-on concepts for future work.

Websites:

Name: SCOTT ROBERTS

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NASA Center: Jet Propulsion Laboratory

Institutions: Any or all

SMD Division: Planetary Science

Keywords: additive manufacturing, porous materials, multiphase flow

Research: Scott's research is focused on applying new materials and manufacturing techniques to solving JPL's spaceflight problems. His thesis was primarily focused on the development of metallic glass alloys for low-temperature, lubricant-free actuators and gearboxes. Since joining JPL, he has found a second home supporting the thermal management groups in utilizing advanced manufacturing techniques to revolutionize their hardware. Ongoing projects focus on integrated 2ϕ thermo-structural solutions to provide thermal conductivities orders of magnitude greater than aluminum while being seamlessly integrated. Examples include thermal runaway-resistant Li-Ion battery cases, integrated electronics housings, and next-generation flexible heat pipes. He also works on using additive manufacturing for creating structures with locally microporous structures.

Mentoring: Being able to work with a variety of students, faculty, and individuals from all over the world and across all backgrounds is one of the best parts of my job. I've been serving as a mentor at JPL for over a decade, often taking multiple summer students and trying to maintain at least one year-round student at all times. I often help co-advise terminal MS students at local colleges, offering them the ability to work on a more "applied" project with a direct infusion path.

I also often serve as an advisor for undergraduate senior design projects, the most successful of which started during Covid and has now grown into a fully-funded cubesat mission built by undergrads at the university to demonstrate a novel JPL thermal management technology in microgravity for the first time.

I also like to serve as an unofficial mentor via programs such as uStrive and Letters to a Prescientist. I believe humanizing researchers is crucial to letting students know this world is for everyone, no matter your background, gender, personal beliefs, orientation, or anything else some might try to consider you an 'other' for.

Websites: https://scienceandtechnology.jpl.nasa.gov/scott-roberts

Name: Spiridon Kasapis

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NASA Center: Ames Research Center

Institutions: All, especially 4-year institutions

SMD Division: Heliophysics

Keywords: Machine Learning, Space Weather, Prediction

Research: My research interests lie at the intersection of machine learning, Heliophysics, and Astrophysics, where I explore the application of data-driven methodologies to enhance our understanding of cosmic phenomena. Driven by the challenge of predicting solar activities, such as solar flares and active regions, my focus is on developing machine learning models that surpass traditional physics-based approaches in accuracy and efficiency. This involves not only improving space weather forecasting but also investigating the synergy between machine learning and traditional physics models to create a comprehensive framework for understanding celestial events.

In the broader field of Astrophysics, my ambition extends to utilizing machine learning for the detection and study of Earth-like exoplanets and their host stars. By analyzing stellar environments and photospheric disturbances, I aim to refine our understanding of these cosmic systems. Leveraging the power of advanced computing and physics-informed machine learning, my research is dedicated to unveiling complex astrophysical processes, with the ultimate goal of enriching our comprehension of the universe and its intricate dynamics.

Mentoring: My mentoring approach is centered on creating an inclusive and engaging environment where all students feel respected and valued in their research journey. Emphasizing inclusivity, I ensure every student, irrespective of their background, feels involved and supported, tailoring my guidance to meet their unique needs and learning styles. Respect is paramount in my interactions, where constructive feedback and recognition of each student's efforts foster a culture of mutual esteem.

Engagement and real-world application are key facets of my approach. I actively involve students in hands-on activities and collaborative projects, simulating the dynamic nature of scientific exploration. This not only deepens their understanding but also sparks their enthusiasm for research. Personalized mentorship, through regular one-on-one sessions, allows me to address individual challenges and aspirations, guiding students to develop their full potential. By integrating these principles, I aim to cultivate a nurturing and productive research environment that prepares students for both academic and professional success.

Websites:

Name: Tabb Prissel

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NASA Center: Johnson Space Center

Institutions: 4-year colleges, and any or all institutions.

SMD Division: Planetary Science

Keywords: igneous petrology, Moon, magma, lunar samples

Research: The story of a planet's evolution is written in the geochemical signatures of its crust. Earth's primary crust and ancient history has been erased by active plate tectonics and eroded by wind and water. Differentiated planetary bodies without plate tectonics or atmospheres best preserve the geochemical evidence of ancient crust formation and evolution in addition to providing insight regarding the early Earth.

My research theme focuses on understanding the evolution of planetary crusts with perspective rooted in sample science (e.g., Apollo samples and lunar meteorites). My work then integrates experimental petrology, orbital mission data, and geochemical modeling to reconstruct the earliest history of planetary surfaces and their transition to secondary and tertiary crust building. This research theme is thus designed to support the Planetary Science Division of NASA's Science Mission Directorate.

Some example topics include developing planetary geothermometers via study of temperature dependent partitioning of elements between minerals and magmas, synthesis of planetary analog materials for reflectance spectroscopy studies with application to orbital mission data, experimental phase equilibria studies aimed at constraining primary magma compositions and mantle sources, and unravelling the processes involved during the initiation of secondary crust building on the Moon.

Some additional areas of scientific or technical interest would be the analysis of martian meteorites, differentiated or achondrite meteorites, terrestrial analogs for planetary systems, and what these samples can tell us about the history of Mars or other rocky bodies throughout the solar system.

Mentoring: I employ a student-centered approach to teaching and mentoring. My student-centered approach stems largely from my personal journey into the geosciences. I never expected to become a scientist growing up, but that changed when my undergraduate advisor explained that geologists are more than just scientists, "geologists are storytellers." I was a traveling musician at the time, and my mother is an artist, so linking the art of storytelling with science resonated with me. Here I seek to connect student's interests inside and outside of the classroom (e.g., art, music, athletics) with scientific topics to promote genuine and sustained engagement.

Storytelling remains a significant component of my teaching philosophy today. I developed my philosophy as a teaching assistant (physics, geochemistry, planetary materials), volunteer science instructor for elementary students, and primary research advisor to high school, undergraduate, and graduate students. Throughout my time teaching and advising, I have found that storytelling successfully bridges critical thinking with effective communication, and that students who learn to effectively communicate their science become more successful at advancing their careers. I have also found that storytelling transcends cultural backgrounds, and my emphasis on storytelling allows me to authentically entice, engage with, and more readily relate to the diversity of students and perspectives in my classroom and laboratory.

Finally, I have shared experiences with nontraditional students and career paths. In response to and in support of the Bridge Program, my guiding philosophy is that multigenerational experience should be leveraged for scientific and historical context, but not seniority of ideation. I firmly believe that such a fresh perspective from our early career team members and students is of critical importance for tackling major outstanding issues in planetary science, and this philosophy, at its heart, is thus aimed at welcoming, encouraging, and uplifting the next generation of scientists. Here I will work to empower questions from early career colleagues and encourage more senior members of our team to present results and discussion in a manner that, regardless of experience level, will lead all to learn and grow together and thus become colleagues in discovery.

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NASA Center: Ames Research Center

Institutions: Any

SMD Division: Planetary Science

Keywords: Mineralogy, Mars, Habitable Worlds, Coevolution of life and the Earth System

Research: My research involves using the mineralogy and geochemistry of the rock record to reconstruct ancient conditions and processes on Earth and other rocky planets like Mars. This work aligns with NASA's Planetary Science Division goals involving identification of habitable environments beyond Earth and exploring connections between the coevolution of early life and ancient conditions on Earth.

Part of my job as a Mars Science Laboratory (MSL) Mission science team member is to help disseminate mission findings and data. Potential projects and faculty collaborations suited to undergraduates could involve learning how to access and analyze publically available data from the MSL rover to answer science questions and hypotheses about early Mars formulated by students.

Mentoring: As a NASA scientist I feel fortunate to be in a position that provides the intellectual freedom to follow my curiosity on a scientific journey. As a mentor, my main goal is to provide the resources and environment that allow others to experience the same sense of freedom and exploration that are so enriching. I recognize that personal drive and the diverse life experiences of individuals are critical in shaping the approach, questions, and insights that students gain in their research. I embrace this, allowing me to contribute to an inclusive educational environment.

Websites:

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NASA Center: Glenn Research Center

Institutions: Any

SMD Division: Planetary Science

Keywords: Planetary surfaces, Atmospheres, Venus, Extreme Environments

Research: Primary research has focused on in-situ science, instruments and platforms in extreme environments (E.g. Venus, Moon). As examples, Developing a long duration science platform to operate on the surface of Venus for months, Developing a Venus seismometer.

To a lesser degree, have been champion and lead on planetary astronomy from a stratospheric scientific balloon

Mentoring: The general approach I have used in mentoring or guiding is summarized in this following steps:
1) Establish a vision (why is this important, what problem is solved, or what new benefit / knowledge will be gained
2) Frame the scope and constraints (what time, resources or technical boundaries exist)
3) Let team assess options and select path, be available to answer questions, help avoid pitfalls, and have access to information they may not otherwise know about
4) Support through the process and make sure they have what they need to press ahead
5) Along the way, help them self-assess performance, and manage progress and the learning process
6) Encourage celebration of achievements
7) Help them look ahead at what may be is next, How can this be shared, used, improved, or built upon?

Websites: Relevant links or papers may include: https://www1.grc.nasa.gov/space/geer/, https://ntrs.nasa.gov/api/citations/20190034042/downloads/20190034042.pdf, or https://www.sciencedirect.com/science/article/abs/pii/S0032063319303563

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NASA Center: Johnson Space Center

Institutions: Any and all

SMD Division: Planetary Science

Keywords: lunar petrology, achondrites, impact cratering, shock deformation

Research: My expertise are related to the evolution of the primary crust of the rocky planets and moons and their subsequent reworking by impact processes. I frequently undertake highly coordinated microstructural, geochemical and isotopic analyses of returned samples and meteorites with the overarching goal of placing crustal evolution in a spatio-temporal context across the Solar System. This work is supported through high end electron microscopy (SEMs. TEMS) and mass spectrometry (SIMS, LA-MC-ICP-MS), which enables highly coordinated textural analyses that in turn guide high-resolution isotopic and trace element studies. Current projects include the origin of granitic materials on planetary bodies lacking plate tectonics and an active water rock cycle, and the role of hypervelocity impacts on the production of crust. Beyond these studies, I have extensive experience in the studies of terrestrial impacts, shock deformation of major and accessory minerals and U-Pb geochronology of planetary materials.

Mentoring: Active, hands-on learning not only helps reinforce the general concepts and fundamental background knowledge that underpins our research but direct data collection by visiting students and researchers also enables the project to be realized to its fullest potential. As such, visitors will be encouraged to lead data collection efforts and post processing with full support and training from the Astromaterials research staff. We will provide hands on training of state of the art electron microscopy techniques including energy dispersive spectrometry, electron backscatter diffraction and hyperspectral cathodoluminescence analyses. In addition we can offer access and training for current astromaterial sample preparation methods including grain mount and thin section preparation, colloidal polishing and argon ion polishing.
Research will be undertaken in an environment that encourages and values the open participation of and communication from all members regardless of skill level. As such, it is critical for all participants to be active listeners and remain cognizant that implicit biases remain despite our efforts to dismantle them. We recognize that research projects work best when all members are provided a full and equitable position in the project and will work to ensure that knowledge is shared across the team, recognizing that all members will benefit from the knowledge of their collaborators regardless of status, career stage or other factors.

Websites: https://ares.jsc.nasa.gov/people/bios/timmons-m-erickson/

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NASA Center: Jet Propulsion Laboratory

Institutions: All

SMD Division: Planetary Science

Keywords: electric propulsion, plasma physics, optical diagnostics, Hall thrusters, gridded ion thrusters

Research: I work on development and flight qualification of electric propulsion systems, mostly Hall thrusters and gridded ion thrusters. Our primary focus is on developing thrusters that can meet the demanding performance and lifetime requirements of NASA's planetary science missions to destinations beyond Earth's orbit. My research includes both laboratory testing and computational modeling. I'm particularly interested in diagnostics for thruster plasmas, with a focus on optical diagnostics such as laser spectroscopy. Development of new diagnostics can be a good fit for university collaborations. We are also interested in partnering with university research groups with expertise in areas outside electric propulsion, such as materials science, if their expertise can be leveraged toward improving the next generation of thruster designs.

Mentoring: Working with students is one of my favorite parts of my job at JPL. I have supervised 1-3 interns for each of the past 6 summers, identifying projects that will make valuable contributions to JPL's research goals and that have an appropriate scope to be challenging yet feasible. I strive to be available for frequent (daily) interactions with my mentees, to get to know them personally, and to set aside time for discussions beyond our immediate research project related to graduate school, career paths, institutional culture, etc. I have also mentored a number of students from under-represented groups through non-NASA programs such as the American Physical Society's National Mentoring Community. Inclusivity was recently adopted as one of the top three fundamental guiding values for JPL, and I feel passionately to contributing to a more equitable distribution of research funding while working to broaden the diversity of both our permanent workforce and our collaborators.

Websites:

Name: VICTOR EYO

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NASA Center: Wallops Flight Facility

Institutions: ALL

SMD Division: Astrophysics,Heliophysics,Earth Science,Planetary Science

Keywords: Strain, Sensor, Gas, Leak, Balloon

Research: High-altitude super-pressure balloons are a suborbital carrier for astrophysics, heliophysics, earth science, and planetary investigations supported by the NASA Science Mission Directorate. Data obtained from balloon-borne instruments is crucial in addressing specific scientific objectives. Balloon-borne instruments will be essential for development and testing of new technologies and student outreach.

Balloons have been used for decades to conduct scientific studies. Scientific ballooning has made important contributions to NASA's programs providing access to near-space conditions. Scientific ballooning will continue to contribute significantly to NASA's strategic objectives.

While the basics of ballooning have not changed, balloon size has increased, and their dependability has improved measurably. The Balloon Program capabilities are being expanded through the development of a Super Pressure Balloon (SPB) which will be the platform utilized for Ultra-Long Duration Balloon (ULDB) missions. The SPB project is managed under NPR-7120.8, NASA Research and Technology Program and Project Management Requirements. The project is developing advanced materials for a super pressure balloon design. The SPB project is seeking to develop a stable balloon platform to float at mid-latitudes.

This research study is aimed at developing sensors for measuring strain on the balloon film and gas leak during its operation.

Mentoring: I like to allow students to work as independently as possible without constraining them with real world issues like budget and schedule. That fosters creativity. I like to allow them to wander a bit beyond the problem at hand - how does what we are doing tie into the environment around us? As a mentor, I don 't shy from discussing diversity and inclusion and how it relates to the research at hand.

Websites:
https://www.nasa.gov/scientificballoons/overview/#:~:text=The%20primary%20objective%20of%20the%20NASA%20Balloon%20Program,the%20Earth%2C%20the%20solar%20system%2C%20and%20the%20universe.

Name: Vilem Mikula

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NASA Center: Goddard Space Flight Center

Institutions: Who is not afraid to start something new.

SMD Division: Astrophysics

Keywords: Infrared detectors

Research: I am serving as an Electronics Engineer in the Detector Systems Branch of the Instrument Systems and Technology Division. The work responsibilities are focused on the development of next generation sub-kelvin cryogenic detectors for Space Flight missions. The major responsibility is to develop, design and test high performance detectors to meet NASA strategic goals. I am responsible for fabrication development of detectors for applications in the spectral range extending from the submillimeter to the x-ray.

Mentoring: We have a few summer students each year in our GSFC NASA's Detector Develop Laboratory = DDL and I am mentoring them sometimes. Students get experience working in ultra-clean room environment at DDL. Work and research in advanced cryogenic and vacuum systems.
I am offering to student (with grant) cooperation with the fabrication of a modified TES detector for the identification of gravitational wave energy using relatively cost-effective processes. The risk is too high due to it is unknown area. Final detector of gravitational waves may not work at all.

Websites: https://www.youtube.com/watch?v=bj0U8VXuuwU

Name: Peter Maksym

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NASA Center: Marshall Space Flight Center

Institutions: any

SMD Division: Astrophysics

Keywords: Observational astrophysics, black holes, X-rays, galaxies

Research: I am interested in the feeding habits and environments of the massive black holes that we typically find at the centers of galaxies. I study them using observations of other galaxies across the electromagnetic spectrum, but my main focus is on imaging spectroscopy from the Chandra X-ray Observatory, images or spectroscopy from the Hubble Space Telescope, and the Imaging X-ray Polarimetry Explorer (IXPE). Special interests include black hole feedback (how do black holes blow powerful winds that self-regulate their feeding and influence the evolution of their host galaxies), deep surveys (the formation and evolution of the earliest black holes), tidal disruption events (what happens when a star is shredded by a black hole) and other aspects of galactic centers (like the properties and behavior of obscuring accretion structures and outflows associated with black holes. Examples of research projects might include 1) studying and interpreting X-ray and optical observations of galaxies hosting "faded quasars". 2) studying and interpreting ultraviolet and X-ray spectroscopy of tidal disruption events 3) studying and interpreting deep X-ray counterpart observations to a uniquely powerful James Webb Space Telescope field, in order to study black holes and variable phenomena 4) studying and interpreting deep Chandra observations of powerful quasars which are actively influencing their host galaxies 5) investigating novel concepts for new X-ray observatories

Mentoring: There is no substitute for a hands-on approach to science. If a student is interested in pursuing science as a career, then it is important to jump in, get your hands dirty, work with the data and learn its limits. I am leading a wide variety of projects, so I like to give students a little time to explore different projects a little (if there is sufficient time in the program), to see if any particular dataset is a good "fit" for that student's interests and preferences. I'm not afraid to push in new directions and bring new instruments into a study if they're required for understanding, so it's very easy for a student to gain broad exposure to different astronomical techniques. But the most important thing getting started in science is learning the limits of the data: how do we know whether we know anything at all, and how much is just conjecture? Without honesty and humility, there is no such thing as science. I respect my students and work from the assumption that if they're interested and engaged, they're capable. Any subject is interesting if you look at it closely enough, so I try to explain any given subject with enough enthusiasm to relay why we might care about the issues at hand. I try to be patient and available, make a point for regular meetings (to check progress and adjust our approach as necessary), and believe in the importance of understanding and compassion in interactions with other people.

Websites: https://wwwastro.msfc.nasa.gov

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NASA Center: Ames Research Center

Institutions: HBCU, MSI

SMD Division: Planetary Science

Keywords: controls, GNC, controls design,

Research: My research interests are in exploration and implementation of novel control design techniques to achieve a pre-defined objective for varying missions including science missions. Previous work has covered developing alternative control methods for aircraft formation flight, peak-seeking control to increase optimization for fighter aircraft, exploring systems health monitoring approaches and common faults with satellite design particularly for satellite formations, novel control techniques (software and hardware) for deployable spacecraft entry, and online control learning and allocation for systems with reduced aerodynamic information.

Mentoring: I have mentored about ten students during my 7 years at NASA. My approach to mentoring is in meeting 1-2 times a week with the student to receive work updates, provide research guidance, and resources such as databases and introductions to subject matter experts. This is to give the students ample opportunity for independent problem-solving and collaborative definitions of research questions. Understanding that I was once an underrepresented student learning the ins and outs of the aerospace field.

Websites:

Name: William Koshak

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NASA Center: Marshall Space Flight Center

Institutions: HBCUs, but excited to participate with any.

SMD Division: Earth Science

Keywords: Lightning, Climate, Air Quality

Research: Research area deals with examining the inter-relationships between lightning, climate, and air quality. Changes in climate affect the number, location, and strength of thunderstorms (and hence lightning), but changes in lightning also affect climate. The lightning channel reaches extreme temperatures and therefore produces lightning nitrogen oxides (LNOx) that in turn enhance ozone (a greenhouse gas that affects both climate and air quality). LNOx also affects the concentration of highly reactive hydroxyl radicals in the atmosphere that affect the concentration of all greenhouse gases. A primary focus of the research is to better understand and estimate LNOx production geographically, seasonally, and diurnally across the continental US, and to assess future impacts of lightning on various US infrastructures due to a warming climate.

Mentoring: A key and fundamental principle is to treat all individuals with the deepest respect, and to look forward to not only hearing their unique views, but also to actively encourage the individual to offer their unique perspectives and promote their talents. The LNOx research area involves complex scientific issues that require diverse views/talents to make optimal progress.

Websites:
https://nasa.sharepoint.com/sites/EarthScienceBranch/SitePages/Meet%20the%20Scientists.aspx

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NASA Center: Goddard Space Flight Center

Institutions: MSI and HBCU ,

SMD Division: Earth Science,Astrophysics,Heliophysics,Planetary Science,Biological & Physical Sciences

Keywords: attitude control, optimal trajectory design, space system modeling, GNC, rendezvous and soft landing

Research: My research interests are in attitude control, optimal trajectory design, space system modeling, GNC, rendezvous and soft landing. Research in these topics needs deep understanding of aerospace systems and solid STEM backgrounds. Therefore, graduate students are better prepared to work on these types of projects. The results of these topics are applicable to all NASA missions.

Mentoring: I will work with faculty members to direct students to apply the knowledge learned from classes to the real-world problems found in NASA missions so that the solutions can be used in future NASA missions.

Websites: https://scholar.google.com/citations?user=X0AXoLIAAAAJ&hl=en or https://www.researchgate.net/profile/Yaguang-Yang-2